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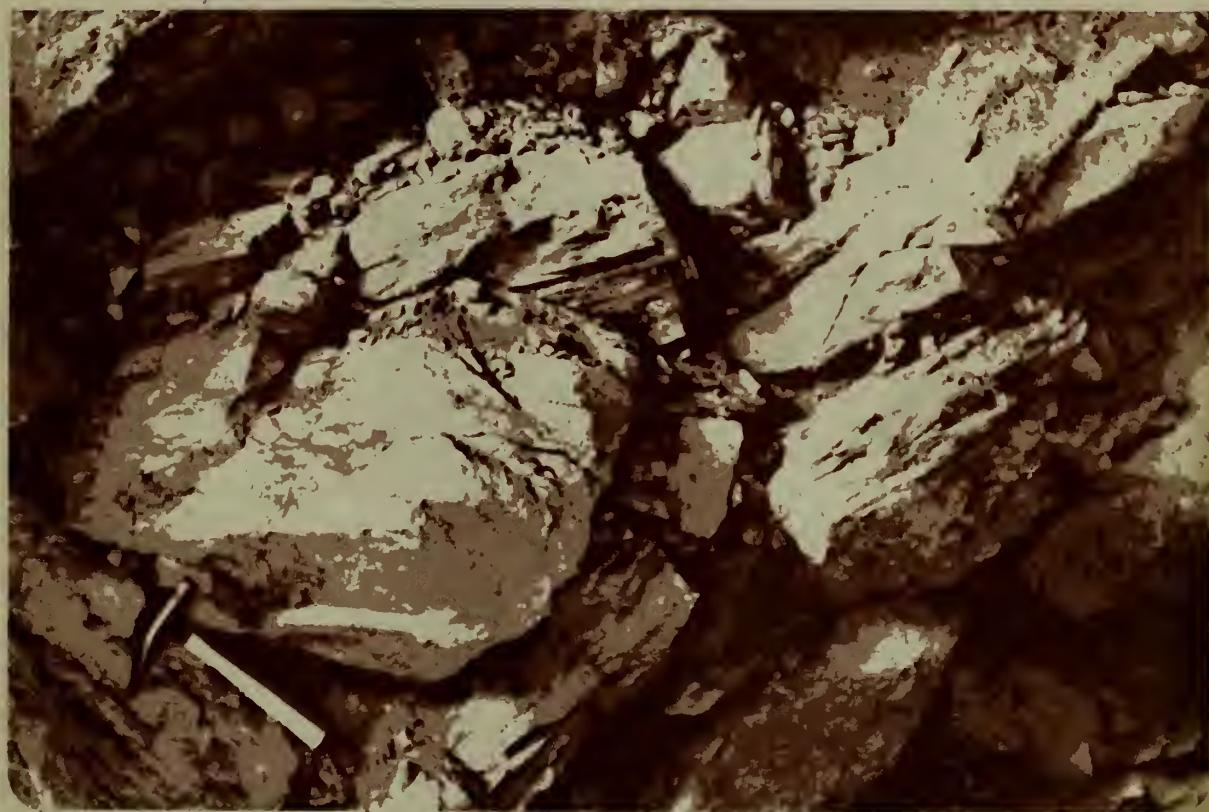
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# INVESTIGATIONS IN RUSSELL CAVE

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*Russell Cave National Monument, Alabama*





# INVESTIGATIONS IN RUSSELL CAVE



Ramp leading into occupied chamber at Russell Cave, prepared as an exhibit-in-place in 1964.

# INVESTIGATIONS IN RUSSELL CAVE

*Publications in Archeology 13*

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*Russell Cave National Monument, Alabama*

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*By John W. Griffin*

*In collaboration with John Earl Ingmanson, and with contributions by John T. Hack, Charles E. Snow, Erik K. Reed, Robert D. Weigel, J. Alan Holman, Andreas A. Paloumpis, and William J. Clench*



*National Park Service • U.S. Department of the Interior  
Washington 1974*

**GERALD R. FORD**  
*President of the United States*

**ROGERS C. B. MORTON, Secretary**  
U. S. Department of the Interior

**RONALD H. WALKER, Director**  
National Park Service

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources." The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

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4. Archeological Excavations at Jamestown, Virginia (PB 177 064).\*
5. The Hubbard Site and other Tri-wall Structures in New Mexico and Colorado.
6. Search for the Cittie of Raleigh, Archeological Excavations at Fort Raleigh National Historic Site, North Carolina.
  - 7A. The Archeological Survey of Wetherill Mesa, Mesa Verde National Park, Colorado (Wetherill Mesa Studies).
  - 7B. Environment of Mesa Verde, Colorado (Wetherill Mesa Studies).
  - 7C. Big Juniper House, Mesa Verde National

- Park, Colorado (Wetherill Mesa Studies).
- 7D. Mug House, Mesa Verde National Park, Colorado (Wetherill Mesa Studies).
8. Excavations in the 17th-Century Jumano Pueblo, Gran Quivira, New Mexico.
9. Excavations at Tse-ta'a, Canyon de Chelly National Monument, Arizona.
10. Ruins Stabilization in the Southwestern United States.
11. The Steamboat Bertrand: History, Excavation and Architecture.
12. The Bertrand Bottles: A Study of 19th-Century Glass and Ceramic Containers.
13. Investigations in Russell Cave, Russell Cave National Monument, Alabama.

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# FOREWORD

Some 9,000 years ago—following the Ice Age, and at least 4,000 years before the great pyramids of Egypt—early men sought shelter in an obscure cavern in northeastern Alabama. This site, which has become a part of the National Park Service (and the subject of this book), contains one of the longest sequences of evidence of man in the New World. The significance of Russell Cave for the study of prehistoric Indians in North America is paralleled by its importance to every citizen, for it is one of the few sites in the United States where the visitor may walk inside the dwelling place and see there the artifacts and habitational remains of the ancient people.

Discovered in 1953 by members of the Tennessee Archeological Society, the cave attracted nationwide attention following an excavation sponsored by the Smithsonian Institution and the National Geographic Society. The cave and surrounding land was purchased by the Society and donated to the American people, whereupon it was established as a National Monument in 1961 by Presidential proclamation. It was further excavated by the National Park Service in 1962, primarily for the development of an in-place exhibit of the deeply stratified layers of cultural remains.

Since that time, thousands of persons have seen these archeological deposits, the tools and weapons of the early Indians, the shells and bones of the animals they ate, the evidence of their hearths, and the

debris of their camps, appearing layer upon layer. The story that is there told is one of hunters and gatherers who for 6,500 years used the cave primarily during the colder seasons of the year. This period, from about 7000 to 500 B.C., known to scientists and historians as the Archaic Period, was followed by the Woodland Period, a time roughly from 500 B.C. to A.D. 1000, also represented in the cave by pottery and projectile points that were likely to have been used with the bow and arrow.

The major portion of this work, written by John W. Griffin, an archeologist with many years of experience in the National Park Service, is intended both as a scientific report, and as a reference for the layman who wishes to acquire a fuller understanding of the long period of time and many peoples who found shelter in Russell Cave. It contains a most important contribution which deals with the cave in relation to the entire archeology of the Southeastern United States, and is enhanced by sections on geology, skeletal analysis, and early animals. It is an outstanding example of cooperation among scholars of the National Park Service and other institutions, and serves as a solid foundation for the interpretation of one of America's national cultural treasures.

RONALD H. WALKER, *Director*  
National Park Service



## PREFACE

The core data and geological investigations presented in this volume resulted from archeological research carried out in 1962 as part of the program for the development of Russell Cave National Monument, near Bridgeport, Jackson County, Alabama.

I was in charge of the project and was on the site during about half of the field season. John Earl Ingmanson was present throughout the period of excavation and exercised day-to-day supervision of the operations. He was also primarily responsible for the recognition and definition of the physical layers followed in the excavation, and in the analysis of the cultural materials contained therein.

Upon completion of the fieldwork, Ingmanson headed up the laboratory work of cleaning and cataloging the cultural materials, and of classifying all these materials save the projectile points. He initiated a study of the stratigraphic distribution of the artifacts, but acceptance of another position in the National Park Service prevented his participation in the final preparation of the archeological sections of this report.

We were fortunate in having an excellent and enthusiastic field crew. The five men, Robert S. Hill, Fred Blanett, Earl Gore, Glen Morris, and Roy Nevils, deserve our special thanks.

Increasingly, archeologists must seek aid from scientists in other disciplines. Dr. John T. Hack, U. S. Geological Survey, worked closely with us in the field on several occasions and prepared the geological section of this report. Dr. Charles E. Snow, of the University of Kentucky, had completed an analysis of the human skeletal remains at the time of his death. We are indebted to Dr. William M. Bass, now of the University of Tennessee, for assuming responsibility for the materials and transmitting Dr. Snow's information to Dr. Erik K. Reed, formerly with the Park Service, who completed this section of the re-

port. Drs. Robert D. Weigel, Illinois State University; J. Alan Holman, Michigan State University; and Andreas A. Paloumpis, Illinois Central College, analyzed approximately 30,000 bones which were recovered, and Dr. William J. Clench, of the Museum of Comparative Zoology, Harvard University, graciously studied the mollusca.

Dr. Clair A. Brown, of Louisiana State University, examined samples for pollen content. Although the findings were negative, we are nonetheless indebted to him for his efforts in our behalf.

Many of our archeological colleagues gave us help and sound advice. We are particularly grateful to James W. Cambron for his classification of the projectile points. Those with whom we discussed problems at one time or another are Bettye J. Broyles, Joffre L. Coe, David L. DeJarnette, J. B. Graham, Alfred K. Guthe, James H. Kellar, Lewis H. Larsen, Jr., Madeline Kneberg Lewis, Thomas M. N. Lewis, Carl F. Miller, and Howard D. Winters. We hope that other people, who through inadvertence may not have been mentioned, will forgive us.

Personnel of the National Park Service provided a constant source of support. J. C. Harrington, who on more than one occasion shouldered part of my administrative duties in order that the project might move forward, deserves special mention. Others who helped in a variety of ways were Elizabeth Albro, Zorro A. Bradley, John M. Corbett, Herbert Olsen, Craig Sheldon, Dale L. Smith, Bert Speed, Gordon Vivian, and Rex L. Wilson. And to many other unnamed individuals in administration, personnel, and secretarial and editorial services, we also extend our gratitude.

October 1970

J. W. G.



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# PART 1: THE SITE AND EXCAVATIONS

Near the northeastern corner of Alabama the Tennessee River sweeps down through the Sequatchie Valley, which is bordered on the west by the Cumberland Plateau. The edge of the plateau is notched and scalloped by coves and valleys that are separated by fingerlike spurs. One of these valleys in Jackson County, Alabama, is called Doran Cove, and here Russell Cave is located (fig. 1).

Doran Cove is a small valley about 6 miles long and rarely over one-half mile in width. The valley is steep sided; at Russell Cave, the valley walls forming Montague Mountain rise about 1,000 feet above the floor of the cove. The cave lies on the west side of Doran Cove, approximately 3 miles from its mouth and about 7 miles from the broad valley of the Tennessee River, which now forms the upper portion of Guntersville Reservoir. The Tennessee State line is three-fourths of a mile north of the site.

This is limestone country, abounding in sinkholes and underground channels. At the base of Montague Mountain, a large sinkhole has exposed a cross section of the underground drainage system extending into the mountain. The system has two chambers, separated by a massive rock pillar (fig. 2). One chamber is open to the level of the floor of the sinkhole and carries a stream of water into the mountain; the other is a rock shelter filled with fallen rock and the debris of prehistoric occupations.

The present floor of the occupied portion of Russell Cave is at an elevation of 625 feet above mean sea level, or roughly 23 feet above the stream level in the adjacent stream entrance to the underground drainage system. The arched roof rises another 25 feet above the surface of the cultural deposits. The mouth is more than 100 feet wide and, with gradually diminishing roof height, the rock shelter is about 150 feet in depth. At the rear, large blocks of stone protrude above the surface of the fill; these are part of a massive rockfall which occurred before the shelter was occupied and which dips toward the mouth, where it lies as much as 12 feet below the surface. Immediately outside the entrance several large blocks of stone, which obviously represent later rockfalls, lie on top of unexcavated fill (fig. 3).

Most of the drainage in Doran Cove is below ground level. The sinkhole in front of Russell Cave

contains a clear, spring-fed pool which flows into the chamber beside the rock shelter. This water, and doubtless that from other sources, pursues an underground path for 1½ miles before emerging farther down the cove as the source of Widows Creek, which flows on to the Tennessee River. Out in the valley, above the cave, the graveled and cobble bed of an intermittent stream called Dry Creek bends sharply and enters through the broken rim of the sinkhole in front of Russell Cave. At intervals, usually in the spring of the year, Dry Creek belies its name; its swollen waters rush down the valley and pour into the sinkhole. Unable to escape through the constricted underground passage, the waters rise rapidly until the surplus reaches the height at which the creek begins to overflow its deeply cut bed and runs off down the valley. For a brief time the pool in front of the cave stabilizes and then, as the flow slackens, the underground release discharges the accumulated water.

A flood in the spring of 1963 crested at about 17 feet above the stream bed (fig. 4). There is evidence that prehistoric floods of the same magnitude affected the earliest deposits left by the human inhabitants of Russell Cave. But through the centuries the deposits gradually accumulated until the final level of occupation of the cave stood 7 or 8 feet above the flood line.

## Previous Investigations

This was the impressive rock shelter that came to the attention of Paul H. Brown and Charles K. Peacock in July 1951. The two men, enthusiastic members of the Chattanooga Chapter of the Tennessee Archaeological Society, had been drawn to the fields below the cave by reports of the presence of projectile points and, while there, they briefly examined the cave and observed that the rock shelter had been occupied by prehistoric Indians. A drip line just inside the mouth of the shelter contained flint chips, projectile points, fragments of Indian pottery, animal bones, and freshwater shells. They did no digging on this first visit.

Messrs. Brown and Peacock returned to investigate the site in November 1951, having secured per-

## INVESTIGATIONS IN RUSSELL CAVE

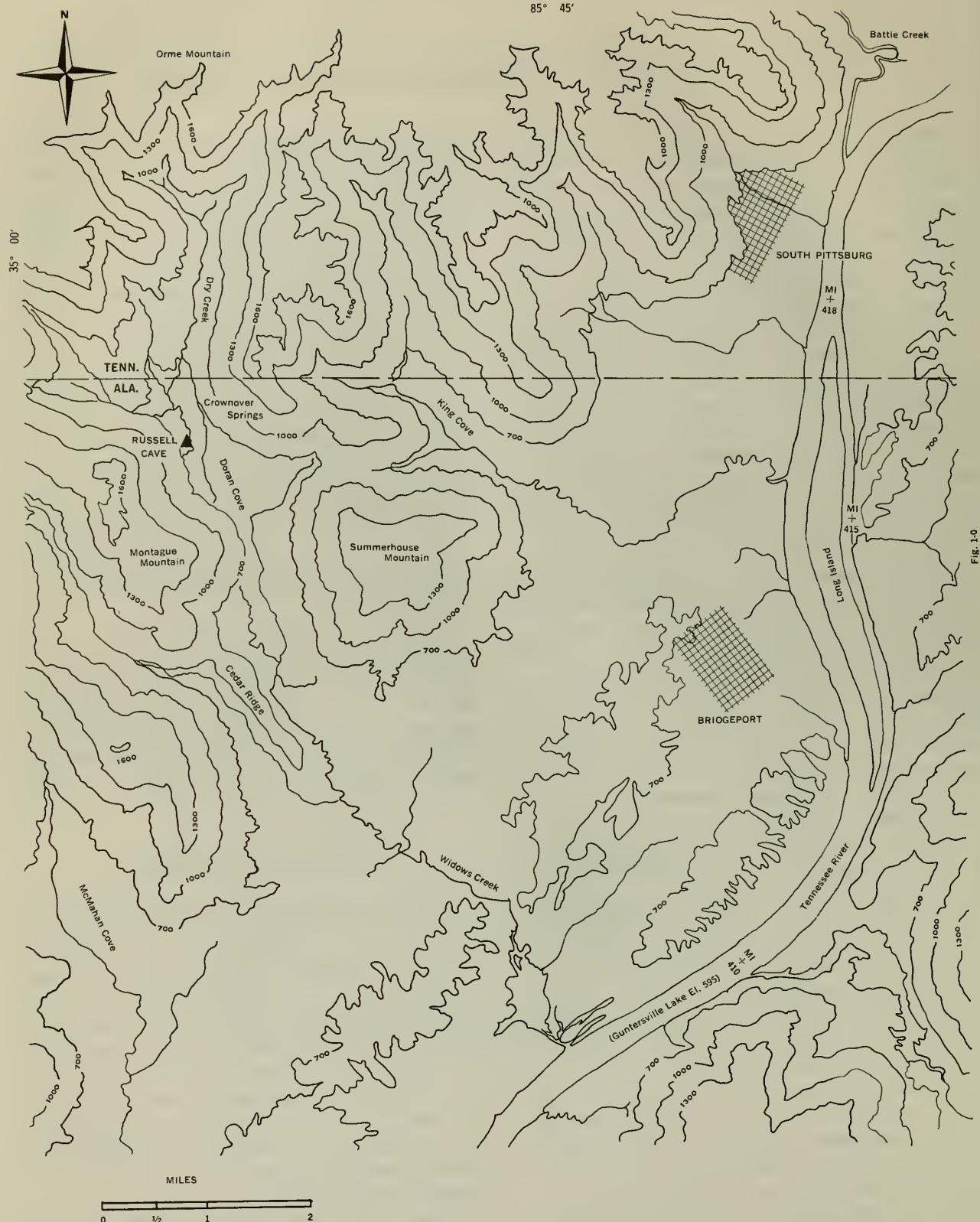


Figure 1.—Locality map, northeast Alabama and adjacent part of south central Tennessee.



Figure 2.—Entrances to the two chambers at Russell Cave, looking north.



Figure 3.—Large blocks of limestone lie on unexcavated fill at the entrance of the occupied chamber, looking northeast.

mission from Oscar Ridley, the landowner. They were joined by LeBaron Pahmeyer, also a member of the Chattanooga Chapter. Still later, another Chattanoogan, J. B. Graham, was added to the group, and the four men secured a lease on the property from Mr. Ridley.

Excavation was carried out by these men and other members of the Chattanooga Chapter from 1953 to 1955. In a published report, Brown outlined the approach to the project being employed by the group (Brown, 1954). After some initial testing, a trench was laid out along the north wall of the rock shelter and squares were assigned to the several participants. The digging was carried out in 1-foot levels. The material was retained by the individuals, but all of it was catalogued so that it would be available for study and reporting. Following the

final excavations by the group, Broyles (1958) published a report of the findings.

The material reported by Broyles came from the trench, about 40 feet long by 10 feet wide, along the north wall. Generally, excavation was confined to the upper 6 feet of the deposit except for a small section at the west end of the trench, which was carried down to 7 feet. Pottery occurred throughout the levels excavated by the group save in the small, deeper area. It became apparent, after further work was done in the cave, that the effects of aboriginal pitting distorted somewhat the pottery distribution. The original investigators found the site very productive, and they thought the barely untouched deeper levels might contain significant early materials.

Recognizing the importance of the site and real-



Figure 4.—View in front of cave taken during flood in winter of 1963, looking southwest.

izing that they could devote only short intervals of time to its exploration, the Chattanooga group called the site to the attention of Matthew W. Stirling, then Director of the Bureau of American Ethnology, Smithsonian Institution.

Carl F. Miller inspected the site, and as the result of his report the Smithsonian Institution approached the National Geographic Society for financial support. This support was granted, and Miller carried out three seasons of excavations in the shelter, totaling 10 months: in May and June of 1956, May through August of 1957, and June through September of 1958. Popular accounts of the first two seasons' work were published in the *National Geographic Magazine* (Miller, 1956, 1958). Brief résumés of the work also appeared in the annual reports of the Bureau of American Ethnology (Stirling, 1957, 1958; Roberts, 1959, 1960). Additionally, short notes have appeared in print (Miller, 1957a, 1960, 1962, 1965), and a number of radiocarbon determinations, to be cited later, have been published.

The accumulated evidence firmly established that Russell Cave had been occupied in Early Archaic times, about 9,000 years ago, and through the ensuing years. It presented a remarkably long and complete record. Miller is preparing a final report on his work, and that report and our present one will stand as essentially separate statements on the same site.

During the jointly sponsored Smithsonian-National Geographic excavations, the National Geographic Society obtained ownership of Russell Cave and sur-

rounding lands from Mr. Ridley, and in 1958 the Society offered to donate the area to the American people as a national monument (Grosvenor, 1958). On May 11, 1961, President Kennedy established Russell Cave National Monument by Presidential proclamation, and Zorro A. Bradley was appointed the first superintendent of the monument.

## National Park Service Excavations

The National Park Service excavations in Russell Cave covered the period from July through November of 1962 and were primarily aimed at preparing for the development of an in-place exhibit of the stratified deposits within the rock shelter. The Smithsonian excavations, which remained open, were not oriented for development of such an exhibit since they had not been laid out with such a plan in view. Regrettably, in the period between the cessation of the earlier excavations and the manning of the area by the National Park Service, considerable vandalism had occurred. In several places large chunks of the deposit had been gouged out, destroying the straight faces Miller had left.

The outlines of Miller's excavation shown in figure 5 should not be taken to represent the condition of the cave when he departed. We recorded his excavation as it appeared when we arrived. Furthermore, most of Miller's grid stakes had been removed, making it impossible to tie in directly with his control system.

For these reasons we oriented our grid independently of Miller's in a location which we felt would provide the clean profiles we would need. This grid (fig. 5) was essentially a trench 25 by 15 feet, made up of 5-foot squares designated A through Q. Squares F, L, and R were staked out on the ground, but they were not excavated because the deposit became markedly shallow on that side of our trench (fig. 6). Later, we opened squares S through W, and one which we labeled AA. All of these last named squares had previously had their top portions removed during Miller's excavation. This was also true of all or part of six other squares which lay within the limits of the previous excavation, as can be seen in figure 5.

Miller's trench, it should be explained, was stepped from its east end toward its maximum depth at the cave wall. The first step, on which he had placed a heavy wooden platform, was about 6 feet below the surface and about 5 feet wide. Beneath

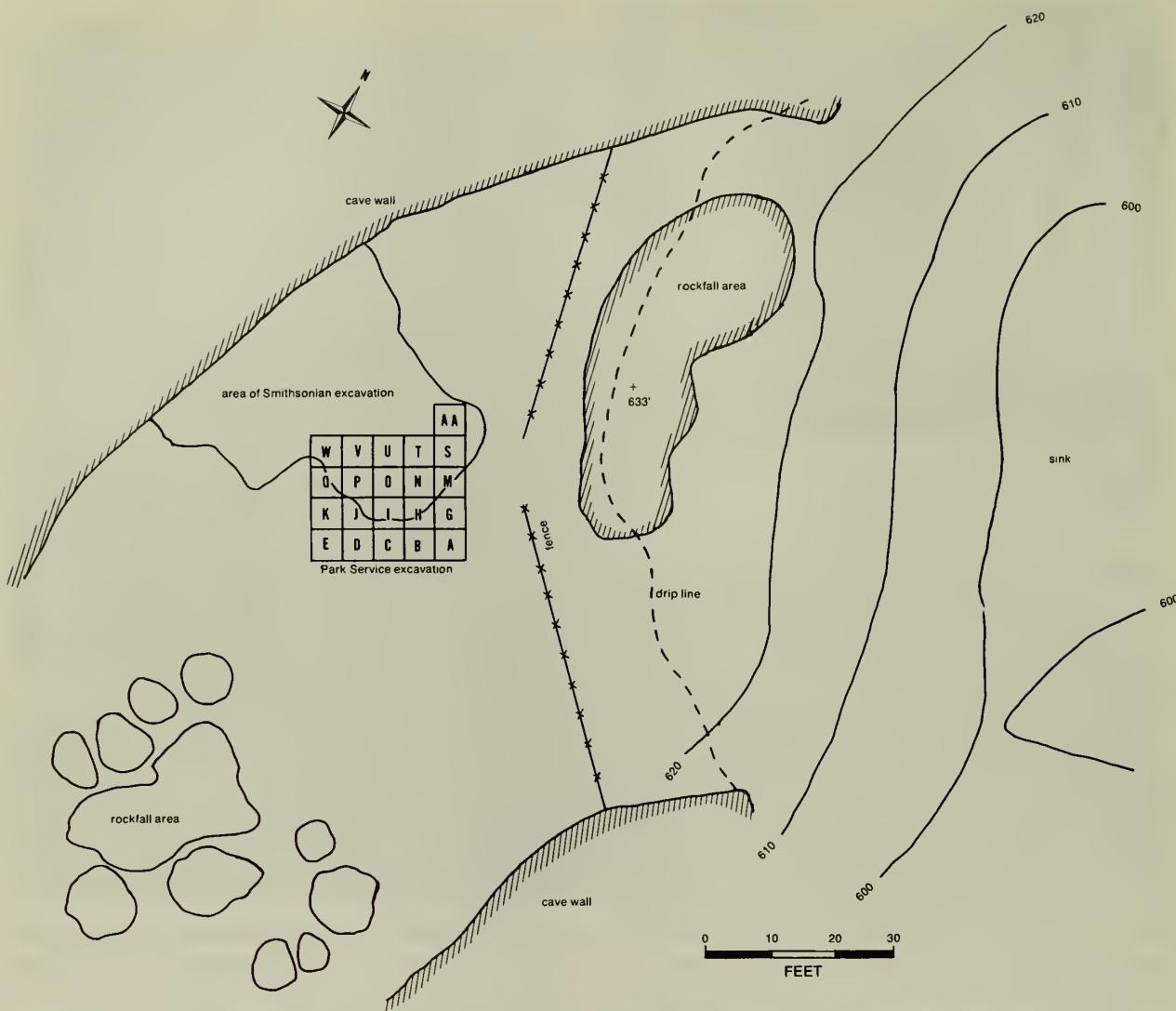


Figure 5.—Plan of area excavated by the Park Service in 1962.

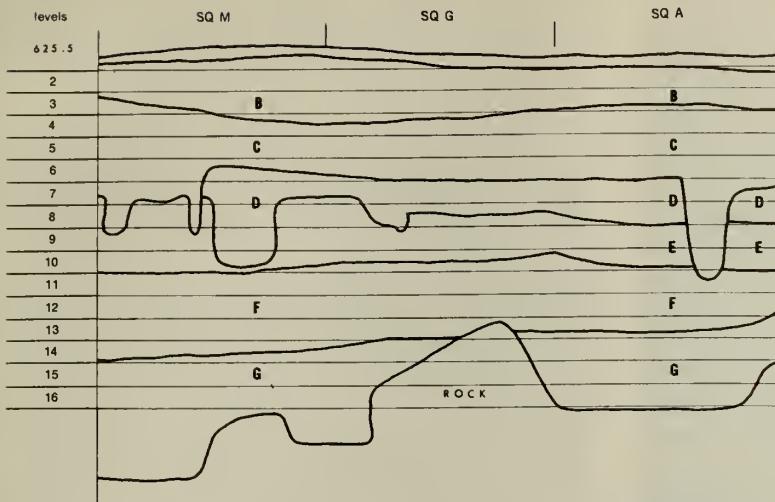
this platform were undisturbed cave deposits. To the west of the platform the trench stepped down again, and this next step extended down to, and into, the heavy rock of the cave breakdown. In his last season Miller excavated to a depth of about 32 feet below the surface at the cave wall, by our measurements. His reported depth, however, was 43 feet (Roberts, 1960, p. 6), a discrepancy which we are unable to explain.

For purposes of vertical control we had a line run into the cave and established several convenient benchmarks with actual elevations—through the courtesy of Park Service engineers who were work-

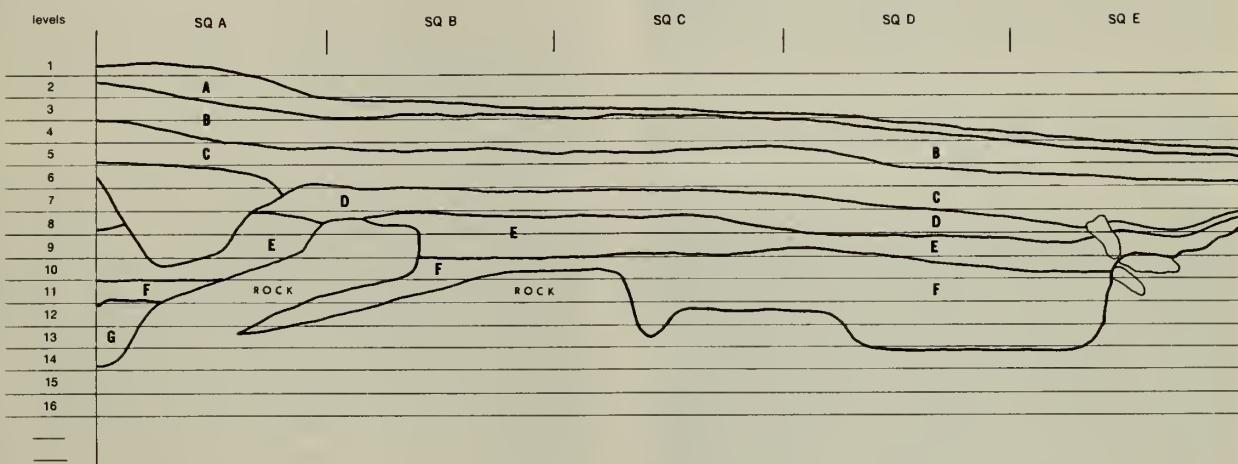
ing in the area at the time. Our vertical figures therefore represent height above sea level.

The deep trench, excavated by Miller to the original cave floor, was a great help to us. The rock "breakdown" and the matrix which filled the spaces between the broken rocks was readily available for observation and sampling. Geological studies were conducted by Dr. John Hack, and his report follows this section of the present volume. Briefly, he has concluded that the major part of the breakdown occurred as a single collapse, that the matrix between the rocks is the result of disintegration of the limestone in place coupled with flood deposition of sand

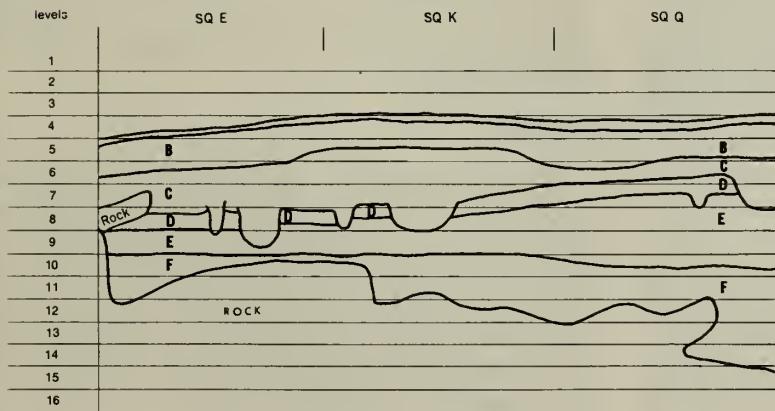
## EAST FACE



## SOUTH FACE



## WEST FACE



SCALE      0      5'

## RUSSELL CAVE PROFILES

Figure 6.—Profiles showing stratigraphy.

and silt, and that actual cultural horizons began above the breakdown. Cultural materials found in the breakdown either washed in or tumbled in. These conclusions, which are entirely consistent with the archeological evidence, led us to work only in deposits above the breakdown. Our maximum depth of excavation was in Square AA, where we penetrated 10.5 feet of deposit. Had we not had the previously excavated section available to us, undoubtedly we would have been tempted to dig deeper in order to understand the physical history of the cave deposits.

We also had the advantage of being able to see a large profile of the culture-bearing deposits. Even a casual glance revealed stratigraphic features of various sorts. Pits and hearths were visible, and in certain portions of the deposit a bewildering array of very narrow, superimposed bands graphically denoted occupation levels. It was apparent that we were facing a situation which would yield valid stratigraphic data if we could only control the excavation properly, and it was equally apparent that this would be no easy job.

From the very beginning we determined to excavate by physical strata, but first we had to obtain a good profile adjacent to the area we wished to approach in this manner. Our initial trench was dug in arbitrary 6-inch levels. Squares H through K and M were opened in this way.

As we examined the faces of the initial excavations, we became increasingly aware of the fine stratigraphic separation of cultural materials, particularly in the upper portions, and of the virtual impossibility of peeling away the fine layers successfully. We therefore defined a series of grosser units of occupational debris above the rockfall in the expectation that this would give a useful chronological separation of cultural remains.

The key to our definition was an apparent continuous bed of whitish particles in a dark matrix which was visible in the walls of the previous excavation and along the sides of our trench in Squares H through K. We then defined three units above and three below this bed on the basis of their maintaining identity over a broad horizontal distribution. Finer discriminations were not traceable around the entire wall of the excavation. The seven units, which we called layers, are described as follows.

#### *Layer A*

This narrow bed of dark soil, averaging about 3

inches in thickness, was the uppermost layer. It had a rather homogeneous appearance, with few of the ash lenses so common in the other layers.

#### *Layer B*

This stratum averaged about 1 foot and varied from 9 to 18 inches in thickness. It contained a great deal of light colored banding within a darker matrix.

#### *Layer C*

This layer contained material similar to Layer B but was characterized by a greater concentration of light ash. The ash lenses were much thicker and less dispersed than in the overlying layer. More vertical disturbance was noticeable and was identified as rodent burrows, filled trash pits, and narrow filled pits probably caused by ceiling drips. The upper margin of this bed had the appearance of a former, well-developed surface. This bed averaged about 1 foot in thickness but thickened to about 18 inches toward the front of the cave.

#### *Layer D*

This layer was the key horizon in the identification of the other beds owing to its unique and ubiquitous aspect: the white flecks in a dark matrix stood out strikingly in the excavation walls. At first glance the white flecks resembled crushed shell, but on closer examination they were found to be bits of light colored limey material. This bed was about 6 to 8 inches thick but thinned slightly toward the interior of the cave. Along the west wall of the excavation it was highly dissected by rodent or drip holes and quite difficult to trace. Although this layer was found to be culturally homogeneous over most of the excavation, it contained earlier material in Square W than elsewhere.

#### *Layer E*

This bed was about 1 foot thick in a typical section and resembled Layers B and C much more than D. However, it did not contain the great quantity of white ash found in Layer C and the matrix was somewhat lighter. Layer E was the source of several large pits which were traceable into underlying layers. Difficulty in extracting material with a dry screen was first encountered here.

#### *Layer F*

This layer contained a light brown matrix in contrast to the five layers above. It also held a great deal

more water and was almost impossible to force through a dry screen without pulverizing all bone and shell in the process. The upper portions of this layer were marked by very bright red fire-staining and some white ash. Charcoal was seldom concentrated, however, and usually occurred in the form of scattered flecks. The red and white, fire-stained lenses occurred sporadically throughout the layer as broad horizontal streaks. Layer F maintained a rather constant surface elevation and was usually about 2 feet thick, with the exception noted under Layer G.

#### *Layer G*

This was the lowest of the physical layers recognized in the excavation. It differed from Layer F mainly in that it sloped upward to the surface of the breakdown toward the south and west faces of the excavation. It filled the interstices between the rocks and thinned out on top of them, displacing the lower portion of what might otherwise have been Layer F. In the northeastern portion it reached a maximum thickness of about 4 feet.

It should be understood that the layers which we defined are not inviolate stratigraphic units. Several factors were at work to confuse the situation. A very minor type of disturbance, which probably did little to affect stratigraphic relations, were small drip holes which showed up in the profiles as a series of icicle-shaped indentations (fig. 7). These represent the dripping of water from the cave ceiling, and their close superposition, particularly in the top levels, suggests short-term abandonments of the site and subsequent re-occupation. It is tempting to see them as direct evidence of seasonal occupation and annual deposition but, of course, they could as well mark a period of several years duration before the particular area was covered.

Rodent holes constituted a more serious threat to the integrity of the stratigraphy. They were numerous but not always discernible. Three sherds were found ten and a half feet below the surface in Square AA, over 5 feet below the lowest true pottery-bearing level. Two of these were seen definitely to come from the looser dark soil of a rodent hole. In Layer C, of Square C, a heavy ash deposit covered most of the area. When its top was first cleaned, it appeared not to have been penetrated, but when 1 inch or so was cut from the ash and an absolutely clean surface was troweled, it was seen that at least 18 rodent

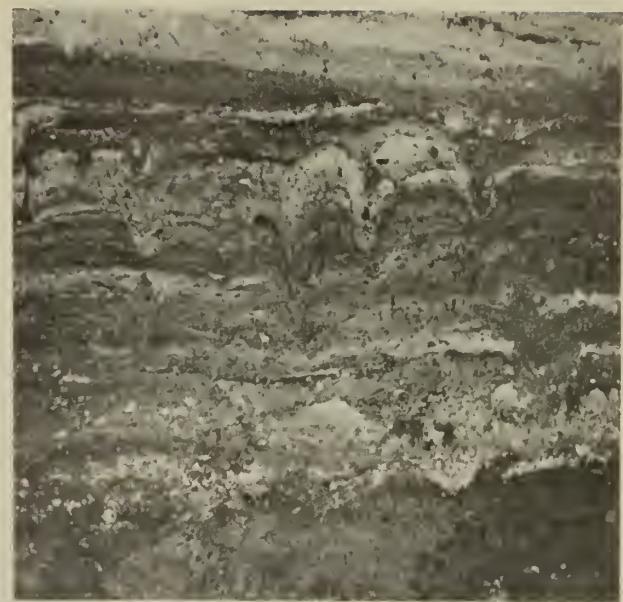


Figure 7.—Icicle-shaped indentations made by drip holes in the fill. Layer D is the heavily flecked stratum near the bottom. Total height of portion shown is about 2.5 feet.



Figure 8.—Rodent holes in Layer C, Square C.

holes had penetrated the ash level which covered about half of the 5-foot square (fig. 8). Obviously, this amount of rodent activity affected the distribution of cultural material in the site. Unfortunately, the greater number of these holes probably escaped our attention. But, as will be seen in later sections, this source of disturbance did not cause confusion to the degree of invalidating the overall sequence.

There were also a few holes of relatively small diameter which appear to be post holes. Several are



Figure 9.—Cross section of a small pit in the fill.

to be seen in the profiles (fig. 6). Most of those that we encountered originated in the upper layers, particularly in Layer C. Miller (1956, p. 555) interpreted the post holes which he found as possible evidence of structures within the cave. We found no patterning to support such an interpretation. There are, of course, a number of other uses to which posts could have been put, such as hide racks or simple devices for suspending possessions above the living floor.

Of more serious consequence to the disruption of the stratigraphy were the frequent pits of various sizes. A number of these may be seen in the profiles (fig. 6). Some were relatively small, whereas others were several feet in diameter. Figure 9 shows a pit in profile, and figure 10 shows several larger pits after they had been cleaned out. The extent of the disturbance due to pits in the Archaic layers below Layer D may be seen in figure 11. Many of these pits contained a number of rocks, which tended to concentrate around the edges of the pits, but we did not find any clear examples of actual rock-lined pits. Frequently, flat rocks were also found at the top of the pits. The pits had probably been dug initially for storage purposes, and some of them may have been rock lined. After the stored contents (acorns, nuts?) had been consumed, the pits were filled. Some refuse was included, but this was probably fortuitous since the concentration of refuse was not sufficient to lead us to believe that they had been dug for the primary purpose of refuse disposal.

An unusual bell-shaped pit had been dug from Layer C, penetrating Layer D and extending into Layer E (fig. 12). As is clearly shown in the photograph, the bottom of this pit contained a heavy con-



Figure 10.—Several larger pits excavated in the fill.

centration of charcoal. Perhaps this was a cooking pit.

During the course of our excavations six burials were encountered in the Archaic layers. Their locations are shown in figure 11, and they are described in the section of this volume prepared by Drs. Snow and Reed. The outlines of burial pits were difficult or impossible to see in the deposits at this level, probably due in large part to subsequent water action since they lay in levels which had been affected by floodwaters before the deposit accumulated to a height above flooding. There are, however, some suggestions that these burials were placed in shallow pits rather than having been placed on the surface and covered with earth. For example, it would seem that a mound of earth subjected to floodwaters would be washed away, with consequent damage and displacement of the bones. At least two of the burials were not so disturbed.

The probability that the burials were placed in pits which we could not see suggests that other pits may have existed in the beds below Layer E, the outlines of which had been obliterated by water action. In general, the projectile point analysis suggests that aboriginal pitting in the Early and Middle Archaic did not disturb the deposits as much as pitting in the Late Archaic and Woodland occupations. The latter pitting, originating after water action ceased to be a factor, was clearly evident when it penetrated Layer F since the fill here was markedly different from the water-laid deposits.

Insofar as possible, it was necessary to take all of these causes of disturbance into account in the analy-

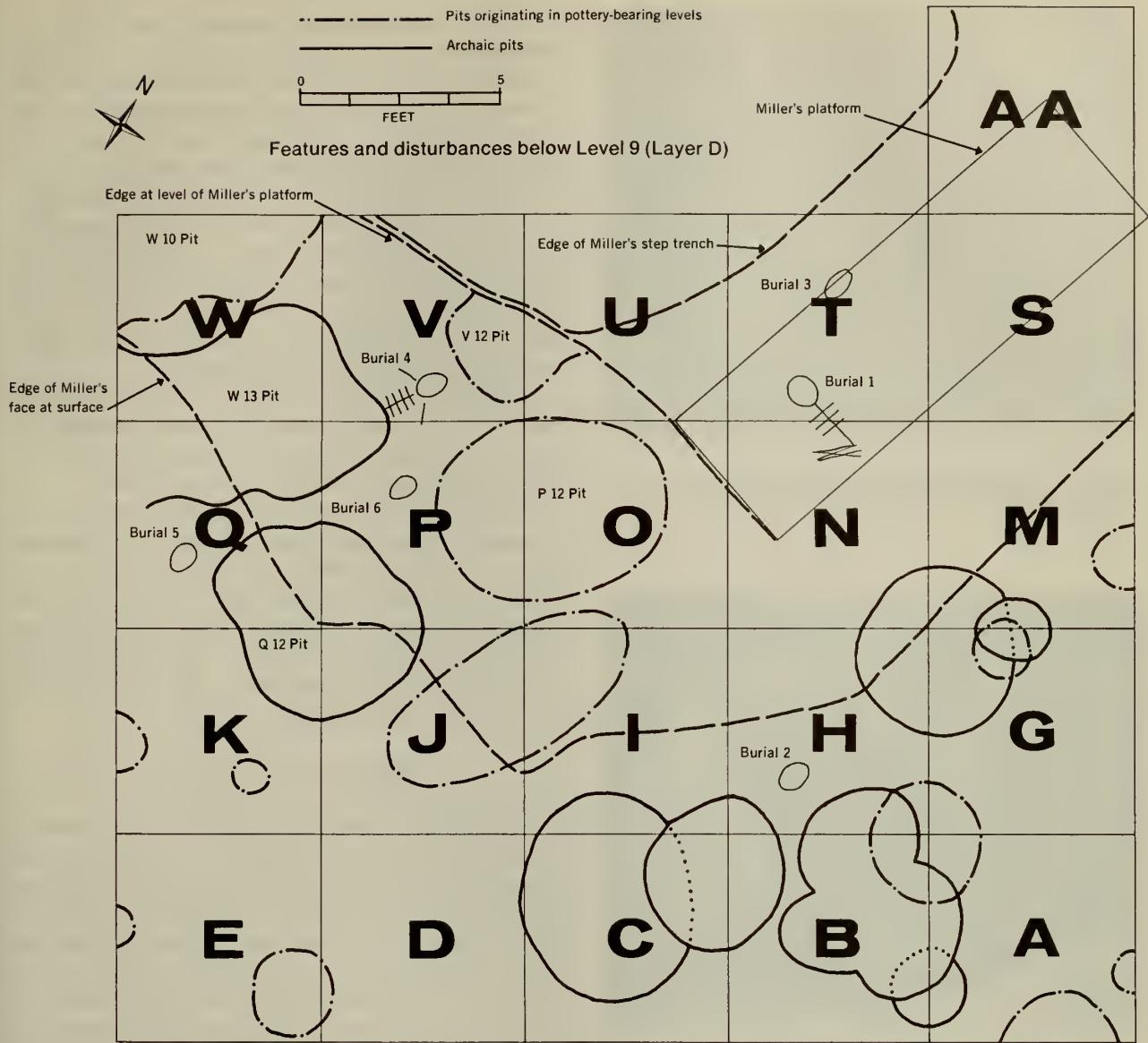


Figure 11.—Plan showing location of storage (?) pits and burials below Level 9 (Layer D).

sis of the site. This was no easy task, and it may be that our analysis is slightly distorted by unrecognized disturbances.

If the place of origin of a pit was unequivocal, the material from it was included in the layer from which the pit originated. On the other hand, if the plane of origin could not be determined, the material was omitted from the analysis. Even after this was done, certain squares disclosing heavy mixture were omitted from consideration. In the pottery analysis, nine squares (B, C, D, E, H, I, J, P, and Q) were selected

as the most reliable. A similar procedure was followed in the Archaic layers. A higher proportion of material from these layers seemed to be usable.

A few words should be added concerning our excavation techniques. The cave was not dry and thus we were not faced with the difficulties of dust-filled air. But we were faced with problems of wet soil which could not be readily screened.

In the upper portions of the squares initially opened, hand screening proved effective. But as we penetrated deeper into the deposit, moisture made



Figure 12.—Cross section of bell-shaped cooking (?) pit extending downward from Layer C, through Layer D, into Layer E.



Figure 13.—Screening matrix with water under pressure.

the matrix a sticky mass which would not pass through our screens. This was particularly true of Layers F and G.

Because of these soil conditions, a different method of screening was devised. A large metal barnyard trough was procured and set near the front of the cave. An electric pump was mounted part way down the talus slope, which drew water from the permanent flow in the sinkhole below the cave and distributed it through several hoses. Small screens, loaded with material from a particular square and level, were placed on the trough, and

water, pressured through a nozzle, forced the matrix through the screen (fig. 13). The muddy water was carried off through a sluice and dumped into the stream below, where it was dispersed by the stream action. In this way, small fragments were lost in the screening but all material which would not pass through a  $\frac{1}{4}$ -inch mesh was saved. We regard the method as highly efficient for this sort of operation.

Artifacts were often noted while loading the screens, and these were frequently isolated by enclosing them in a piece of aluminum foil. They could be easily recognized in the residue on the screen, unwrapped, and individually washed.

While the bulk of the deposit was removed in small careful shovel loads, a very considerable amount of trowel work also went into the project. It was not, however, a trowel-and-spoon job.

Lighting was extremely important. We had the advantage of a power line into the cave. Movable light stands were constructed from pipe and car wheels to provide a flexible light source. This is an absolute necessity in a shelter such as Russell Cave. The Chattanooga group had to work with lamps, as did Miller during his first season. Subsequently, Miller installed electric lights.

### Dating the Sequence

Seventy-three samples of charcoal large enough for radiocarbon analysis were collected during our excavations. Sixteen of these were selected in the belief that they would date the sequence at Russell Cave reliably. All 16 samples were run by Isotopes, Inc. Sample I-702 was submitted for dating by the National Geographic Society; the others were submitted by the National Park Service. The determinations and dates of these samples are given in table 1, together with their proveniences and comments upon them.

With two exceptions, the determinations seem perfectly acceptable to us. One pair of determinations deserving discussion consists of I-824, which should date the Early Woodland of Layer D, and I-831, which was assumed to date the end of the Late Archaic in Layer E. The Layer D date is probably acceptable; at least it compares very favorably with the date of  $2050 \pm 250$  B.P. (M-516) for the same type of pottery from the Camp Creek site in Tennessee. On the other hand, the Layer E date, which should be earlier, actually gives a more recent mean date. However, the ranges do overlap, and it is pos-

TABLE 1.—Radiocarbon determinations and dates for 16 samples from National Park Service excavations in Russell Cave.

Lab No.	Square	Layer	Comments	C-14 Determinations and Dates as of A.D. 1950
I-829	A	B	Must be from later firepit in this basically Late Woodland layer.	$370 \pm 100$ ; A.D. 1580
I-983	J	C	A Layer C, Woodland, pit into Layer E.	$1165 \pm 110$ ; A.D. 800
I-825	M	C	Charcoal from very heavy concentration. Woodland.	$1210 \pm 100$ ; A.D. 740
I-826	P	C	Large Woodland pit (P 12) extending deep into Layer F.	$1500 \pm 175$ ; A.D. 450
I-824	D	D	Dates Early Woodland (Long Branch Fabric Marked).	$2100 \pm 200$ ; 150 B.C.
I-831	B	E	Late Archaic or Early Woodland. See discussion in text.	$1995 \pm 180$ ; 45 B.C.
I-2236	B	E1	Near end of Late Archaic. Preferred to I-831.	$2900 \pm 105$ ; 950 B.C.
I-830	B	E	Base of Layer E, beginning of Late Archaic.	$5490 \pm 200$ ; 3540 B.C.
I-823	A	F	From lower part of Layer F. Middle Archaic.	$5980 \pm 200$ ; 4030 B.C.
I-702	N	F	Charcoal near bones of Burial 1. Middle Archaic.	$6250 \pm 190$ ; 4300 B.C.
I-2238	V	F	Charcoal near bones of Burial 4. Middle Archaic.	$6310 \pm 140$ ; 4360 B.C.
I-2237	W	F(?)	From Pit W 13, penetrating Burial 4. See discussion in text.	$7770 \pm 190$ ; 5820 B.C.
I-827	AA	G	Level 17. Early Archaic.	$7565 \pm 250$ ; 5615 B.C.
I-828	S	G	Level 20. Early Archaic.	$8095 \pm 275$ ; 6145 B.C.
I-822	N	G	Level 20. Early Archaic.	$8435 \pm 275$ ; 6485 B.C.
I-2239	H	G	Charcoal near bones of Burial 2. Early Archaic.	$8500 \pm 320$ ; 6550 B.C.

## RUSSELL CAVE

## DALTON ZONE, STANFIELD-WORLEY

N.P.S.

S.I.

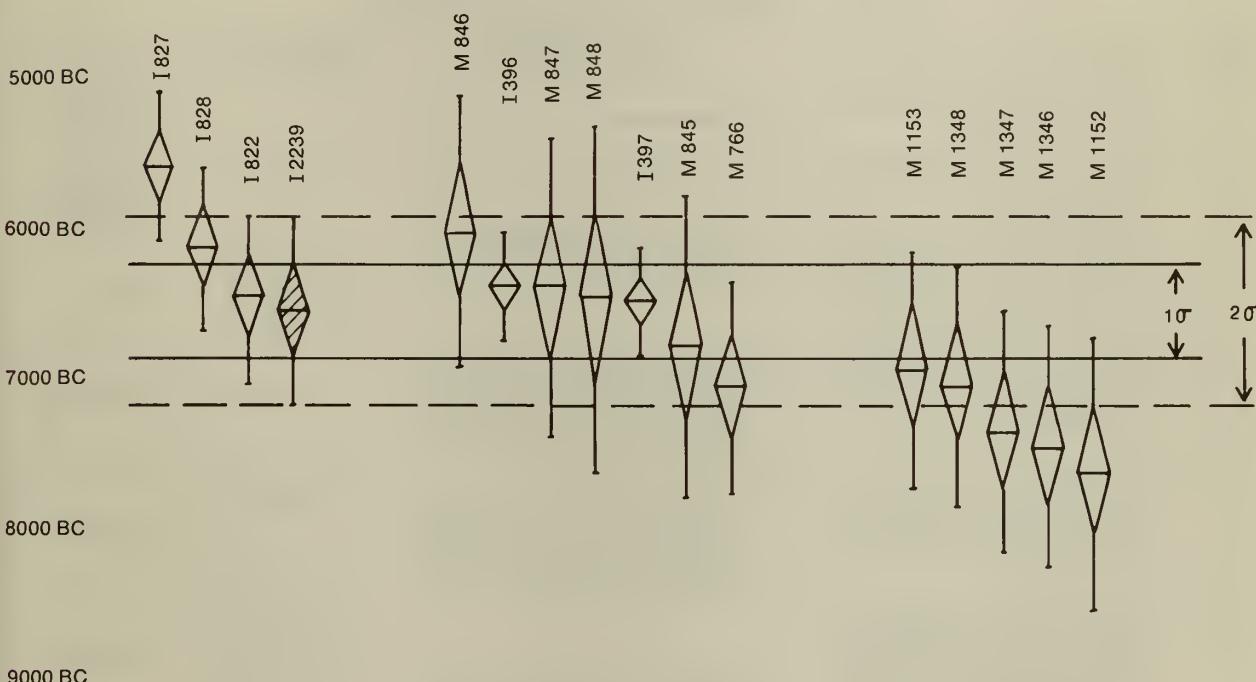


Figure 14.—Graphic comparison of radiocarbon determinations from Russell Cave and the Dalton Zone at the Stanfield-Worley Bluff Shelter.

sible to regard the date as fairly reasonable for our terminal Archaic, or to assume that this may actually be another Early Woodland date.

As a check on this situation, another sample from Layer E was submitted (I-2236). This yielded a determination of  $2900 \pm 105$  B.P., which I regard

as more consistent with a stratigraphic position near the end of the Late Archaic.

The other confusing situation arose in regard to the determination for Burial 4 ( $6310 \pm 140$  B.P.) and that for Pit W 13, which intruded upon and disturbed this burial and yielded a determination of

$7770 \pm 190$  B.P. The discrepancy, which is on the order of 1,500 years, is puzzling. Both samples were composed of scattered charcoal flecks, in the one instance near the bones of the skeleton, and in the other scattered in the fill of the pit. There is no reason to believe that the samples were erroneously labeled in the field or in transmission to the laboratory, and the laboratory is quite certain that there was no switching of identification at that end. The most logical interpretation is that Pit W 13 was dug into earlier levels, that some charcoal was brought up in the process, and that it was re-incorporated in the fill. This interpretation is accepted in this report primarily on the basis that the pit contained some characteristic Morrow Mountain material, which is not believed to be as early as the determination. The sample from Burial 4 is quite close in time to that from Burial 1, which appears to occupy a similar

stratigraphic position. We therefore accept the determination for Burial 4 and assume that the sample from Pit W 13 does not accurately reflect the time of digging and refilling.

In addition to our own radiocarbon dates, there are a number of dates resulting from Miller's work and a single one published by Broyles (1958, p. 2). In the absence of a final report covering Miller's work, it is impossible to correlate his dates with our sequence. It is obvious, however, that his seven earliest dates overlap in the 1-sigma range with our earliest date of  $8435 \pm 275$  B.P. (fig. 14). Five of his dates in this group are stated to come from depths below what we regard as the true occupational base of the cave and may properly be interpreted as material that worked down between the cracks in the underlying rockfall. Be that as it may, the earliest dates from Russell Cave are later than those from

TABLE 2.—Archeological framework for Russell Cave.

Layer	Field Definition by Archeologists	Geological Observations (Based on Hack)	Dates (from C-14 Determinations)	Cultural Periods
A	Thin layer of dark soil averaging 3 inches in thickness.	Superficial deposit.		Mixed: Recent, Mississippian, Woodland
B	Varying from 9 to 18 inches in thickness; resembles Layer C but contains less ash.		A.D. $1580 \pm 100$	Late Woodland and some Mississippian
C	Resembles Layer E but more ash lenses present. Many pits originate from here. Averages 1 foot in thickness, but increases to 18 inches toward front of cave.	Closely resembles Layer E, both mechanically and mineralogically; accumulated in place.	A.D. $800 \pm 110$ A.D. $740 \pm 100$ A.D. $450 \pm 175$	Woodland
D	Clearly visible because of white flecks in dark matrix. Key layer in working out the sequence; 6 to 8 inches thick.	Thin layer distinctive by presence of many fragments of limestone of pebble size; calcite less. Minerals present also found in soil outside cave; at least in part from outside. Disconformable on Layer E.	150 $\pm$ 200 B.C.	Early Woodland
E	Light colored layer about 1 foot in thickness; moderate amounts of ash and charcoal. Large pits originate here and penetrate underlying layers.	Character of fill changes markedly; horizontally bedded; appears to have accumulated in place. Mineralogically mostly calcite, derived from roof of shelter. Process must be very slow. Above level of even highest floods.	45 $\pm$ 180 B.C. 950 $\pm$ 105 B.C. 3540 $\pm$ 200 B.C.	Late Archaic
F	Matrix very similar to Layer G but with more reddish fire-staining in upper portions, charcoal usually scattered. Averages about 2 feet thick, with relatively level top surface.	Reddish-brown silty clay containing inclined and cross-bedded layers of charcoal. Mineralogically resembles fill in breakdown; must have originated outside cave, washed in by floods. Debris of intermittent occupation mixed with or buried in sediments washed in during high floods.	4030 $\pm$ 200 B.C. 4300 $\pm$ 190 B.C. 4360 $\pm$ 140 B.C.	Middle Archaic
G	A reddish-brown clayey matrix, damp and impossible to hand screen. Slopes upward on breakdown, ranging from very thin to over 3 feet. Charcoal seldom concentrated.		5820 $\pm$ 190 B.C. 5615 $\pm$ 250 B.C. 6145 $\pm$ 275 B.C. 6485 $\pm$ 275 B.C. 6550 $\pm$ 320 B.C.	Early Archaic
Rockfall	Yellowish fill between rocks contains sparse cultural debris, interpreted as accidental inclusions from above.	Large part of breakdown apparently a single block, fragmented upon falling. Fall complete by ca. 9000 B.P. Fill between rock partly washed-in sediment, partly limestone disintegrated in place.		Uninhabited. (Some Archaic displaced downward.)

the Dalton Zone of the Stanfield-Worley shelter (De-Jarnette, Kurjack, and Cambron, 1962) which, as we shall see later, is consistent with the story the artifacts tell.

### The Framework

Table 2 presents the various sorts of data which

form the framework for the archeology of Russell Cave. Our definitions of the layers are supplemented by geological information extracted from Dr. Hack's report. The radiocarbon determinations are given and, in anticipation of the results of the analysis of the material culture which appears in a later section of this volume, the cultural affiliations of the layers are indicated.

## PART 2: GEOLOGY OF RUSSELL CAVE

*John T. Hack*

Russell Cave is typical of the many caves which occur in a limestone of Mississippian age at the foot or on the lower slopes of valleys that indent the Cumberland Plateau of south-central Tennessee and northeastern Alabama. Most of them are long narrow tubes that now contain underground streams or have contained streams at some time in the past. The surface drainage of the valleys may be diverted into the caves, to emerge lower down the valley. Springs and sinks at the intersection of the limestone side slopes with the gravelly valley floors are common features.

The archeological site is in a rock shelter at the mouth of a tubular cave system that has captured Dry Creek, the main drainage artery of the upper part of Doran Cove. The cultural remains are intermixed with about 9 to 10 feet of earthy material of natural origin, consisting partly of calcium carbonate and partly of quartzose sand and silt. These deposits accumulated during the last 9,000 years, when the cave was occupied by humans. They rest on about 20 feet of limestone rubble and boulders that contain pockets of limy mud and stream-deposited sand and silt. The natural deposits are in distinctive layers which correspond closely to changes in the archeological sequence. Their origin, and the geology of the site, therefore, are essential to the interpretation of the cultural remains.

The geologic work at Russell Cave was done in April 1961 and in April and May of 1962. The cave was revisited for a few days during the fall of 1962 and again in 1963 so that geologic work could be correlated with the archeological work of John Griffin and his associates described in other sections of this volume. Dr. Dorothy Carroll, mineralogist, U.S. Geological Survey, advised the writer concerning the laboratory analysis and interpretation of samples of the cave deposits. Larry K. Hawkins, U.S. Geological Survey, was the analyst. I am grateful to T. W. Daniel, Jr., Alabama Geological Survey, for his advice and assistance in the interpretation of the back sections of the cave. The following report was completed by the author in 1964 and, except for minor editing, and the addition of one reference, has not been changed.

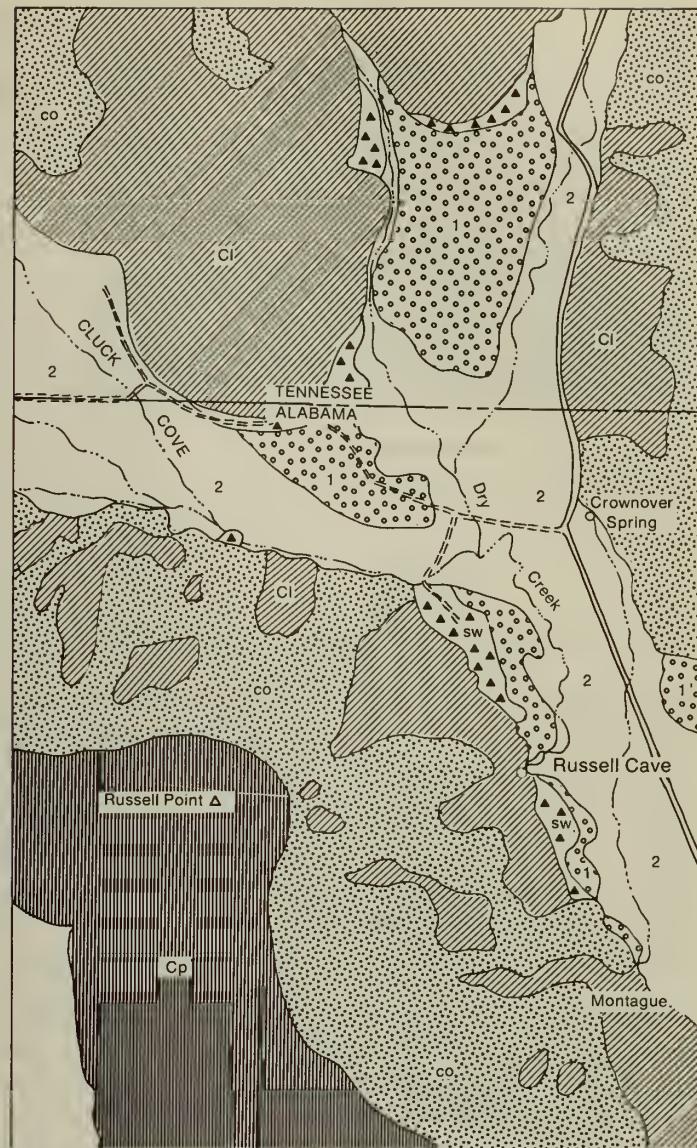
### Geologic Setting

Doran Cove is a narrow valley about 6 miles long that heads in the Cumberland Plateau 3 miles above Russell Cave. At the cave the valley walls are about 1,000 feet high. A resistant sandstone caps the plateau and forms cliffs 20 to 40 feet high that rim the upper slopes. They belong to the Pottsville Formation of Pennsylvanian age which, beneath the caprock, also consists of shale, sandstone, and coal. The upper 250 feet of the slopes are underlain by these beds. They are not visible in most places because they are covered by landslide blocks and boulders of sandstone that have slid down from the caprock (fig. 15). Beneath the Pottsville are approximately 800 feet of shale and limestone that in Alabama have been grouped, in descending order, into the Pennington Formation of shale and limestone, the Bangor Limestone, Gasper Limestone, and St. Genevieve Limestone, all of Mississippian age (Butts, 1926). As described by Butts, the Bangor, Gasper, and St. Genevieve are all highly cavernous and consist of fossiliferous oölitic and bioclastic limestones that range in texture from very fine to coarse. The Bangor is slightly petrolierous and brownish colored, so it can be distinguished on the basis of its gross appearance as well as paleontologically from the lower limestones. The Gasper and St. Genevieve are for the most part slightly lighter gray in color and contain more oölitic beds. These two formations are much alike physically and in many places difficult or impossible to separate even on paleontologic grounds. In Tennessee they are now commonly grouped in one formation, the Monteagle Limestone (Stearns, 1963), the type locality of which is 15 miles north of Russell Cave. Russell Cave is in the combined Gasper and St. Genevieve of the Monteagle Limestone, probably in the lower part.

The floor of Doran Cove is rather flat and is underlain mostly by gravelly and sandy alluvium, though in places near the valley walls low rolling areas of slope wash consisting of reddish cherty residual clay rise slightly above the alluvial deposits (fig. 15). These areas become more extensive down

QUATERNARY AND RECENT

## EXPLANATION



**Figure 15.**—Geologic map of part of Doran Cove near Russell Cave, showing the distribution of the alluvial deposits and the colluvium on the plateau slopes, surveyed in March and April 1962. Based on Doran Cove quadrangle of U.S. Geological Survey, TVA series, 1:24,000, 1950.

valley. The alluvium is mostly silt, sand, and gravel graded by stream action so that the finer materials are near the surface and the gravelly or cobblely material is beneath. Limestone occurs at shallow depth but is exposed only at the valley sides. The alluvium is arranged in rather inconspicuous terraces separated by low risers generally only a few feet high. The alluvium of the older terraces is commonly more red in color than the younger alluvium, and the older terrace surfaces are more rolling, with occasional un-

drained depressions presumably formed by solution of limestone underneath.

### The Cave System

The gentle regional dip of the rocks to the southeast, toward the Tennessee River, controls the circulation of underground water and trend of the cave system of the region. As shown by ground water studies in a nearby area (Malmberg and Downing,

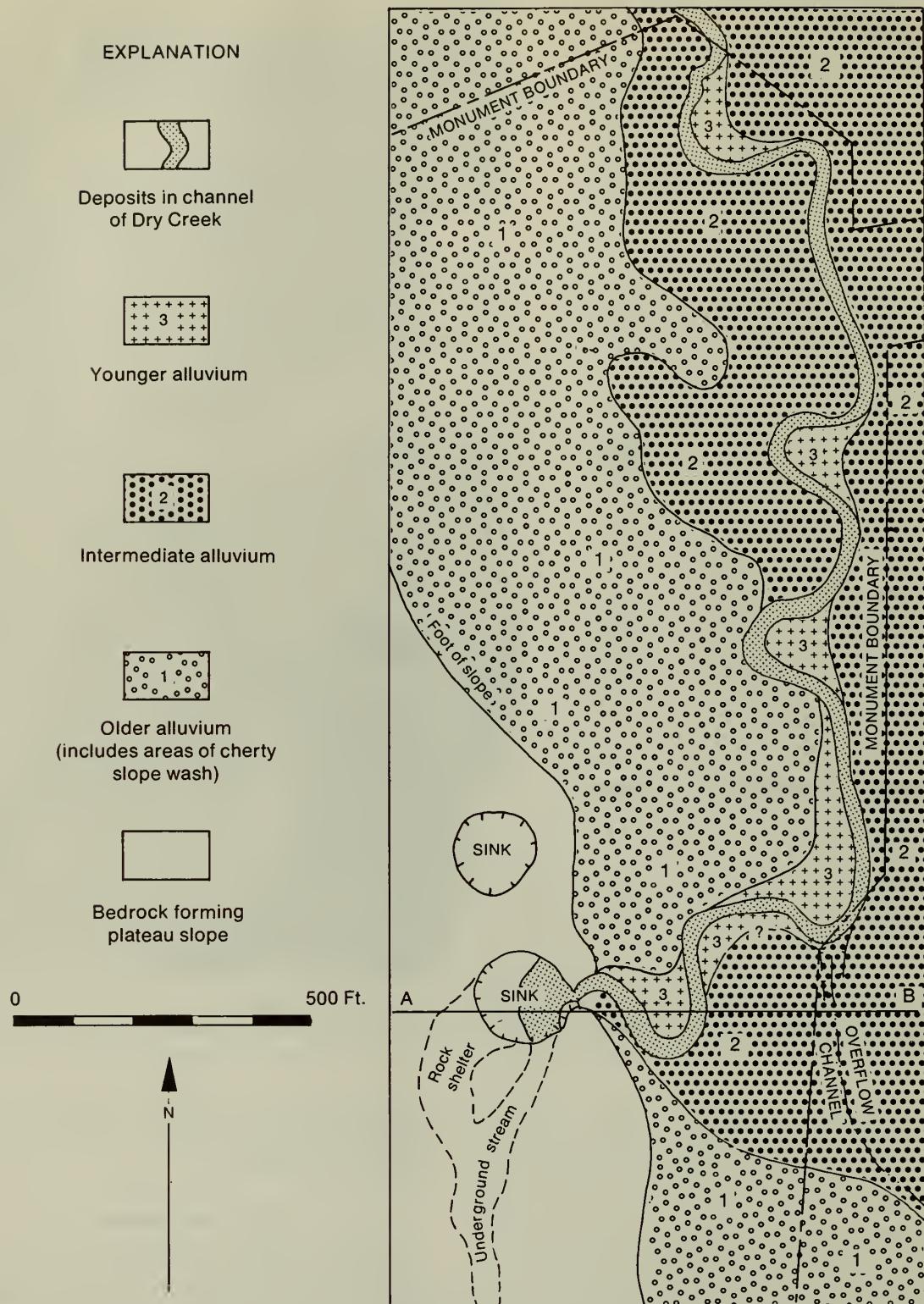


Figure 16.—Map of alluvial deposits along Dry Creek in Russell Cave National Monument. Surveyed in May 1962 with plane table.

1957), the limestones probably contain a network of tubes, fissures, and other openings that trend down dip parallel to the bedding planes and carry a major part of the regional drainage.

Sinks commonly develop at the foot of the plateau slope where the limestone is not covered by gravel or colluvium. At many such places the surface drainage has been captured and diverted under the plateau. Such drainage may be returned to the surface farther down the valley. Russell Cave is part of an underground tubular drainage system in oölitic limestone beds that locally are at or just below the level of the alluvial valley flat. At the archeological site, the roof of the cave system has collapsed, forming a sink, so that a short stretch of the underground stream has been uncovered some 20 feet below the adjacent sloping surface. A cross section of the tube is exposed in the side of the sink where it enters the plateau. The sink has also captured Dry Creek, a wet weather channel that carries the flood runoff and part of the normal wet weather discharge from the entire upstream part of Doran Cove. Russell Cave is large enough in diameter under the plateau to carry off underground all but the large floods. When these occur, the water backs up in Dry Creek and overflows toward Montague (figs. 15 and 16). The underground stream has been explored for about three-fourths of a mile beyond the entrance (Jones, Daniel, Semmes, and Kroeger, Ms.). It curves under Montague Mountain, nearing the valley floor west of Montague, where it is joined by water from other surface channels that also enter the plateau in sinks and caves. At Montague, the tubular system becomes too low to explore further but it presumably continues for at least another mile, eventually to emerge down valley as springs. Sand and gravel, coal fragments, and fine vegetal debris are carried through the cave system during floods.

### Relation of the Cave to the Alluvial Deposits

The entrance to Russell Cave is the sink shown in figure 16. The cave has two openings in the south and west walls of the sink, separated by a massive rock pillar. One of these leads into the dry rock shelter, the other into the underground tube that receives the discharge of Dry Creek. The sink itself is a perennial spring, so that water flows from the sink into the underground tube even in dry weather. The rock shelter is more than half filled with boulders and



Figure 17.—View of the southwest wall of the sink at Russell Cave showing the two entrances to the underground system. A gravelly bar and the stream that enters the cave from a spring on the sink floor can be seen in the lower foreground.

other deposits so that its floor is well above the level of even the highest floods (fig. 17).

Dry Creek enters the sink from a terraced alluvial valley floor (fig. 16). Its channel is almost but not quite graded to the floor of the sink and enters it through a low gap in the limestone rim only a few feet higher than the floor. Upstream from the sink the creek is incised in alluvium and there are no limestone outcrops in the channel. Several terraces border the channel, however, and at least three alluvial fills older than the present channel are exposed in the channel walls.

The oldest, referred to here as the older alluvium or number 1 valley fill, consists of sand and gravel that grades upward near the surface into silty and sandy loam. It is exposed at several places in the banks of Dry Creek. Below a depth of 1 to 2 feet, its color is distinctly reddish, typically moderate reddish orange (10R 6/6) or moderate reddish brown (10R 4/6).\* It forms a low terrace on the surface of the valley flat about 5 to 10 feet higher than the intermediate alluvium. Its surface is quite stony and rolling with broad undrained depressions as much as 10 feet deep, probably caused by solution in the limestone beneath. Near the foot of the mountain slope the older alluvium is overlain by or mixed with cherty silt derived by slope wash from the limestone of the valley wall. The pronounced reddish color of

\* Color names and designations are from the Rock Color Chart, National Research Council, E. N. Goddard and others, 1948.

the older alluvium, the rolling surface, and the undrained depressions are features that suggest antiquity. Other areas of the same alluvial fill are shown in figure 15.

The intermediate fill is much more extensive and encloses the channel of Dry Creek for most of its length. It is gravelly at the base but consists mostly of sandy loam with lenses of gravel. It is more yellow and less red than the older alluvium and is typically moderate brown (5YR 4/4) or dark yellowish orange (10YR 6/6). The surface of this alluvial deposit is sandy or silty and less stony than the older alluvium. It is very little dissected and only slightly rolling. There are no distinct undrained depressions, but east of the creek in rainy weather water stands in shallow ponds, suggesting that some slumping or collapse has taken place, perhaps because of solution of the underlying limestone.

The younger alluvium or number 3 fill is confined to a narrow band along the channel of Dry Creek (fig. 16). It is sand and gravel in the upstream exposures, becoming more silty near the entrance of Russell Cave. The color is less reddish than the older alluvial fills, commonly grayish orange (10YR 7/4) or moderate yellowish brown (10YR 5/4). Near Russell Cave the deposit becomes laminated sand, silt, and clay, darker in color and mixed with partially decayed leaves and leaf fragments. It has the appearance typical of deposits formed in standing water.

The present channel of Dry Creek is floored by a bed of cobbles of sandstone similar in size to the cobbles and gravel in the alluvial fills. In places there are bars and low terraces of sand. Samples of the

cobble gravel on the surface of the stream bed have a mean size between 25 and 50 mm. The creek enters the sink at Russell Cave over a low cascade or sill and continues with a gravelly bed into the underground cave. Inside the cave entrance the stream is bordered on each side by terraces 16 to 20 feet high that correspond to the younger alluvium and that consist of laminated organic clay, silt, and fine sand. Five hundred feet farther in, the ceiling lowers to a height less than 3 feet above the bed, forming a constriction that limits the flow that can enter the inner passages. Beyond this point the cave widens out and the ceiling rises, but the deposits in the cave bear no recognizable relation to the terraces outside.

The laminated organic silt and clay that comprise the younger alluvium near the cave are a backwater deposit formed during flash floods when the inner cavern is unable to carry the entire discharge. At these times the water ponds, and in so doing it fills the lower part of the sink and backs up in the stream channel. Sometimes the water overflows the banks and whatever cannot be discharged through the cave runs off down valley to Montague and beyond. A shallow overflow channel leads off from the top of the south bank of Dry Creek at the lowest point in the valley flat, about 700 feet upstream from the cave. The location of the overflow channel is shown in figure 16. The longitudinal grades of the different terrace surfaces, the grade of the creek bottom, and the position of the overflow point are shown in figure 18. Note that the surfaces of the younger and intermediate alluvium are nearly horizontal between the cave and the overflow point, whereas the creek

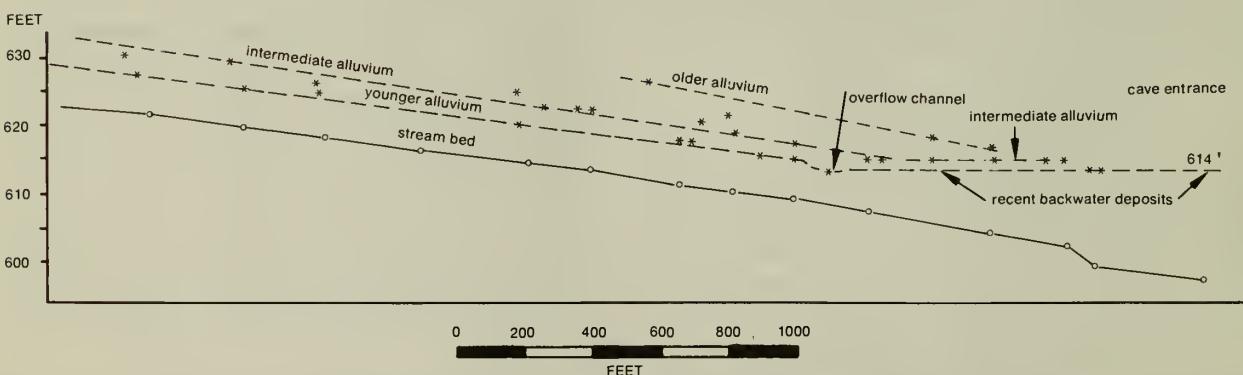
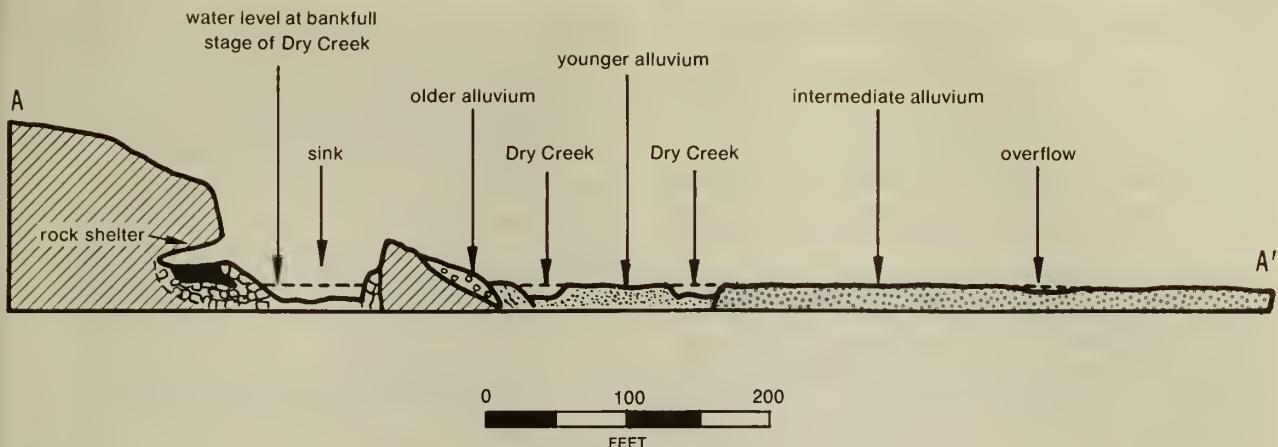


Figure 18.—Longitudinal profiles of Dry Creek and the alluvial terraces within Russell Cave National Monument showing the backwater deposits that form horizontal terraces both outside and just inside the cave mouth.



**Figure 19.**—East-west cross section through the rock shelter, extending east across the valley floor beyond the overflow point. Orientation of the section (A-A') shown in figure 16.

bed slopes downstream, maintaining its normal gradient. A cross section through the cave and across the valley flat is shown in figure 19.

The surface of the intermediate alluvial terrace is parallel to younger alluvium, and near the cave entrance it is also horizontal. This suggests that the water must have been ponded at the cave mouth during the deposition of the intermediate alluvium. The highest elevation of this terrace near the sink is 615.5 feet, 2 feet higher than the younger alluvial terrace. The grade of the older alluvium shows no evidence of ponding, for the terrace surface does not have a stretch that is horizontal. It slopes down valley at a more or less uniform rate, roughly parallel to the grades of the younger deposits. Thus evidence near the cave indicates that Dry Creek was captured by the formation of the sink before deposition of the intermediate alluvium, and that the level of ponding of the floodwaters has been at least 614 to 616 feet for a considerable period of time. The level of ponding could have been higher than 616 feet, because both the younger and the intermediate terrace might be submerged during very large floods beneath a sheet of water several feet deep. A flood in the spring of 1963 entered the cave at an elevation of 617.5 feet, 2 feet higher than the level of the intermediate terrace (Zorro A. Bradley, written communication, 1963).

### Frequency of Floods

There are no stream-flow records for Dry Creek from which the recurrence of floods in the past can

be determined accurately, but estimates can be made. Wolman and Leopold (1957, pp. 88-90) have shown by analysis of records of many streams that the cross-sectional area of a stream channel has a certain relation to the amount of water carried by the stream when in flood. In most streams, the channel is just large enough when bankfull to carry a flood that has a recurrence interval between 1 and 2 years. Thus, in the case of most streams, it can be expected that the channel will be filled to overflowing every few years. Of course the recurrence of floods is irregular and in some years several overbank floods may occur, whereas several years or even many years may elapse without the occurrence of a single flood. Floods higher than the bank also occur on all streams and they may cover the floodplain and even terraces to depths of several feet. The number of years that elapses on the average between these higher floods becomes greater and greater as the height of the flood increases.

Applying these generalizations to Dry Creek, since the lowest point on the present bank is 614 feet, it is inferred that the water will rise to that elevation at the cave mouth at least once every few years. However, the water may rise higher at less frequent intervals and flood the surface of the intermediate alluvium, as it did in 1963. According to long-time local residents of Doran Cove (Zorro A. Bradley, written communication, 1963), floods of Dry Creek have occurred at an average of about 5 years. A flood of the extent of the 1963 flood that crested at 617.5 feet occurred in 1945. A still higher flood occurred in 1900.

## Antiquity of the Alluvial Deposits

No fossils, artifacts, or carbonaceous material have been found in either the intermediate or older alluvial fills. By comparison with other areas in the Appalachians, however, it is inferred that the older fill is at least as old as Sangamon times. Denny (1956), for example, has shown that pronounced reddish soils in Pennsylvania were covered by glacial drift of Wisconsin age, which is light brown or gray in color. Nikiforoff (1955) argued that reddish subsoils in the Coastal Plain of Maryland are as old as Sangamon. The degree of dissection of the older alluvium at Russell Cave, as well as the development of sinks beneath it, are evidence of antiquity. The older alluvium is preserved along the margins of Doran Cove in a number of places but occupies less than half of the valley floor. Wherever it does occur, its surface is higher than the intermediate alluvium. Since it is not seen in the walls of the channels trenched in the intermediate alluvium, it is inferred that the older alluvium was eroded over large areas before the intermediate alluvium was deposited. This great amount of erosion is also evidence of antiquity.

The intermediate alluvium may be of Wisconsin age and partly Recent. In the vicinity of Russell Cave, judging by the color, this alluvium is at least somewhat oxidized.

The younger alluvium may be quite recent in age. It is simply a narrow terrace deposit within a channel eroded in the intermediate fill. It may consist

mostly of point-bar deposits that have been laid down on the inside of meander bends as the channel of Dry Creek has migrated. The difference in elevation between the ponded silts of the younger alluvium (614 feet) and the ponded silts of the intermediate alluvium (615.5 feet) is too small to have any significance. The drop in elevation of 1.5 feet may have been caused by deepening of the overflow level, which caused a slight lowering of the average level of ponding.

## Deposits in the Rock Shelter

The archeological site is in the floor of the rock shelter, in the western and now abandoned entrance to the underground stream system and cave (figs. 17 and 20). Both entrances are carved by solution from oölitic limestone, a rock composed of minute sand-sized spherical grains called oölites. The oölitic beds are separated by thin beds of a more dense, greenish, slightly clayey limestone (fig. 20), but these shaly beds contain less than 10 percent material other than carbonate. The impurities are primarily quartz and montmorillonite, and there is some evidence of dolomite on X-ray diffraction patterns. Oölitic limestone, such as the rock at Russell Cave, is commonly both porous and permeable, so that water can seep in small amounts through intergranular openings in the rock (Imbt and Ellison, 1947). The permeable nature of the cave roof is related to the origin of the cave deposits.

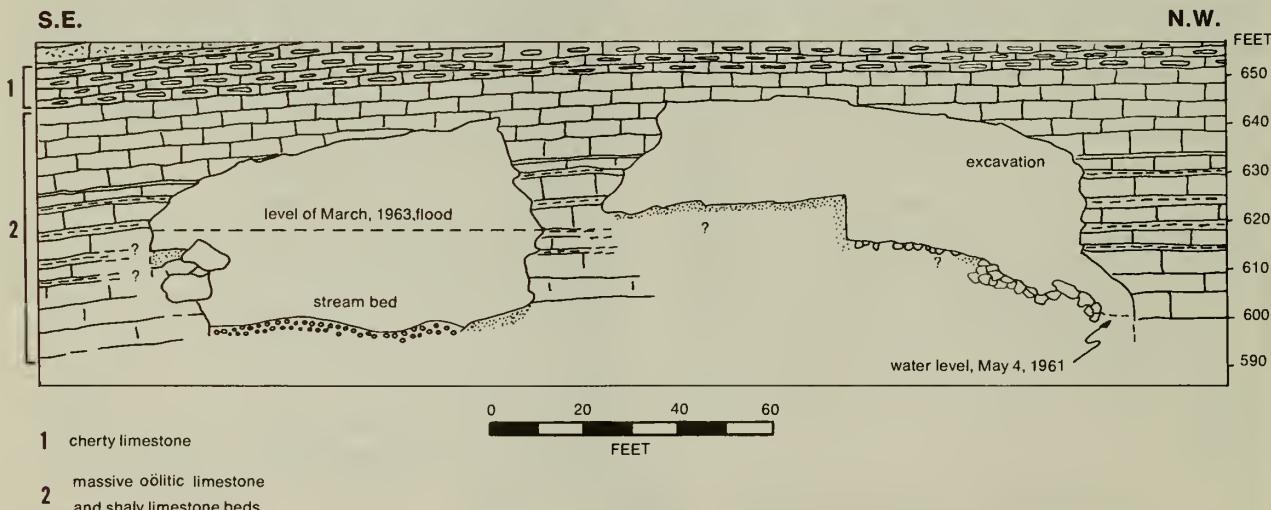
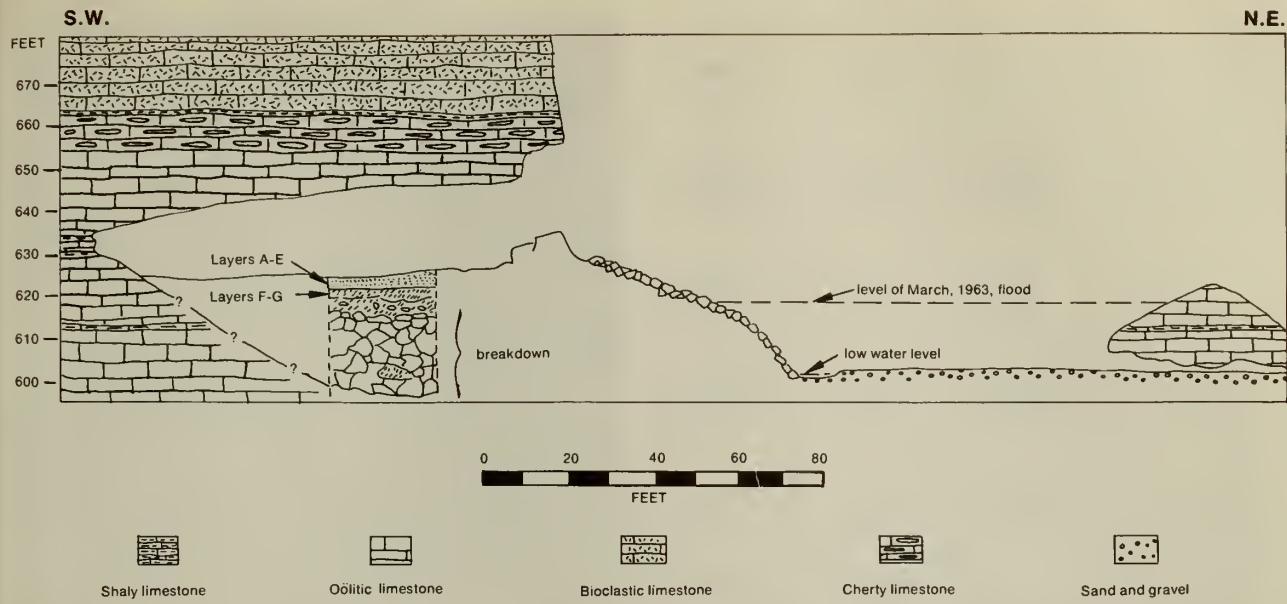


Figure 20.—Cross section through two entrances of the cave southwest of the sink, showing the area excavated in 1962. Since 1962, part of the excavated area has been filled in.



**Figure 21.**—Profile through the rock shelter across the sink from southwest to northeast, in a direction N.  $53^{\circ}$ E., showing the deposits in the shelter and their relation to the flood level.

The archeological site lies in the outer part of the rock shelter (fig. 21). Its present surface, underlain by gray silty mud, is at an elevation of 625 feet, or approximately 23 feet above the stream level in the adjacent stream entrance to the underground drainage system. The original excavations extended about 32 feet below the surface. The lowermost part of the fill consists mostly of large blocks of limestone that had fallen from the ceiling and walls. This kind of deposit is commonly known as "breakdown."

When examined in 1960 and 1961, the lowermost part of the trench in the breakdown, to an elevation of 597 feet, was below water level and partly filled with a slurry mud that could not be pumped out, and so the walls could not be examined. However, probing indicated that the bedrock was probably at an elevation of 593 feet. The top of the breakdown, although very irregular, has an average elevation in the original trench of about 613 feet, just below the level of bankfull floods in Dry Creek outside the rock shelter. Much of the breakdown exposed in the excavation is apparently a single large block of limestone that broke in pieces on falling to the floor. Individual beds of oölitic limestone can still be traced through the mass of blocks, and the bedding is distinctly visible (fig. 22).

Many of the spaces between the blocks of breakdown are now filled with fine-grained sediments.



**Figure 22.**—View of breakdown on the west wall of the excavation, showing the rough continuity of the bedding planes that carry through the individual blocks. The beds are dipping at a  $45^{\circ}$  angle to the left, that is, toward the center of the rock shelter. The hammer handle, perpendicular to the bedding planes, rests against a massive bed and the handle points to a more fissile bed below.

These consist partly of sand and silt but mostly of detrital quartz that was brought in from the outside by the Dry Creek floods. The fine-grained material

TABLE 3.—Size classification of Russell Cave sediment samples in percent.

No.	Description	Elevation (ft.)	Date Collected	Larger than 2.0 mm.	1.0— 2.0	0.5— 1.0	.25— .5	.125— .25	.062— .125	.002— .062 <sup>1</sup>	Smaller than .002 mm. <sup>2</sup>	Percent sand <sup>3</sup>	Percent sol. in HCl. <sup>4</sup>	
Sediment between boulders in breakdown.														
3	Quartz sand at water level	604	4/19/61	8.4	.65	.67	5.9	23.0	18.0	43.6	59.17	12.69	48.2	
10	Brown silt with charcoal	607	10/25/61	.16	.65	2.21	3.8	9.28	12.04	59.17	38.34	10.17	27.98	
608	10/25/61	11.36	1.66	5.59	3.36	10.65	6.9	3.9	4.27	47.5	21.79	15.0	40.13	
11	Brown silt	610	4/19/61	5.7	1.9	5.4	6.9	3.9	13.6	4.75	13.55	21.79	15.0	
4	Calcareous gray clay	613	10/25/61	.14	.52	1.12	1.46	2.86	4.78	72.55	49.7	13.8	31.7	
12	Brown silt									16.57		8.9	10.74	
Plastic gray clay at top of breakdown.														
5	Gray calcareous clay	614.5	4/19/61	.65	.42	.92	1.3	2.1	2.8	63.0	62.68	23.09	7.54	
94A	Gray calcareous clay	615.1	10/16/62	.82	1.16	2.12	2.46	3.45	4.52	76.89	76.89	14.29	13.71	
94B	Gray calcareous clay	615.3	10/16/62	.36	.56	1.11	1.51	2.00	3.28				30.94	
Layers G and F														
6	Gray clay with charcoal	616	4/19/61	.71	.51	1.2	2.1	3.4	3.6	62.7	67.8	25.0	10.81	
617	Brown clay with charcoal	617	4/19/61	.20	.53	.85	1.8	2.8	3.08	5.22	65.44	19.74	6.18	
617	10/16/62	1.65	.92	1.68	2.27	1.23	1.50	3.24	5.75	64.69	22.60	13.17	22.90	
618.2	10/16/62	.63	.60	.60	1.27	1.32	2.52	5.21	71.37	71.37	12.32	12.32	23.86	
618.2	10/16/62	.44	.36	.36	1.18	2.12	1.93	2.12	80.97	80.97	10.68	10.68	19.98	
620.2	10/16/62	.36	.46	.98	1.40	2.54	4.70	4.70	74.87	74.87	12.0	6.67		
621.4	10/25/61	.48	.97	1.47										
622.0	10/25/61													
Layer E														
96A	Gray ash silt	621.2	10/16/62	1.94	.81	1.75	3.42	6.67	7.65	59.11	64.91	7.55	20.30	
621.4	10/16/62	3.88	2.09	2.13	2.71	4.70	6.98	8.09	8.09	64.91	9.33	7.55	18.55	
621.0	10/16/62	2.20	2.41	2.51	3.51	6.98							23.50	
Layer D														
97A	Gray silt with pebbles	621.6	10/16/62	13.76	2.06	1.96	2.95	5.37	6.07	44.10	46.95	23.00	18.41	
622.4	10/16/62	13.68	2.14	1.52	1.90	4.23	6.48	6.48	6.48	46.95	23.00	16.27	39.98	
Layer C														
98A		623.0	10/16/62	6.99	2.28	2.56	3.29	7.06	12.16	56.97	8.69	27.35	60.54	
Layer B														
98B		624.5	10/16/62	4.05	2.76	2.85	3.93	7.18	7.74	60.18	11.31	24.46	66.78	
Samples collected outside the rock shelter.														
15	Residual soil from hill slope	10/25/61	1.59	1.25	1.48	1.92	4.27	4.62	56.83	50.56	60.56	28.04	13.54	
17	Silty flood deposit in stream entrance	10/25/61	.11	.10	.37	.70	1.35	21.79	21.79	8.9	8.9	8.9	2.82	36.51
8	Sand from stream bed	10/25/61	1.8	1.0	1.9	9.5	4.97	13.8	13.8	13.8	13.8	13.8	13.4	75.9

<sup>1</sup> Location of sample with respect to designated layer is uncertain.<sup>2</sup> These percentages may be inaccurate because of difficulties in separating silt from clay.<sup>3</sup> Includes all material less than 2 mm., and more than .062 mm. in size.<sup>4</sup> Percent of whole sample.



**Figure 23.**—Stream entrance to the cave, showing a pile of breakdown probably similar to the one now in the rock shelter. Below the level of the flood terrace, in the center of the photograph, the interstices are filled with flood deposits, mostly fine sand and silt.

is partly disintegrated limestone derived by the weathering of the breakdown itself, and one sample of mud (sample 4, table 3) consists entirely of material contained in the limestone bedrock, that is, calcite with minor amounts of silica and montmorillonite. The fine-grained material also contains some evidence of human occupation, such as charcoal and shell fragments. These may have been washed in with the sediments or could have fallen down from above through openings in the breakdown. At one time the breakdown may have resembled the breakdown that can now be seen near the walls of the stream entrance (fig. 23).

Immediately above the breakdown is a yellowish-gray layer of plastic or gummy calcareous silt and clay that forms the base of the main culture layer. This layer contains many rock and some shell fragments, but the dominant constituents are quartz sand and silt. The shell fragments, plus some charcoal, suggest that it formed contemporaneously with occupation of the site. However, the layer resembles closely the fill between the blocks of breakdown and is evidently composed mostly of floodwater deposits.

The series of units of occupational debris recognized by the archeologists begins with Layer G and

contrasts markedly with the material below, being brownish or grayish in color rather than yellowish, thinly but prominently stratified, and containing abundant charcoal and fire-reddened lenses. The base of Layer G is irregular and ranges in elevation from 616 to 620 feet. In places, Layer G is absent and Layer F is in contact with the breakdown.

#### *Layers G and F*

These layers, taken together, have a maximum thickness of about 4 feet. Though their base is very irregular, the top of Layer F is almost level, at about 620.5 feet. The two layers consist mostly of reddish-brown silty clay containing layers of charcoal that are strongly inclined and crossbedded, as though spread in irregular piles on the rough floor of the cave. The crude crossbedding is made evident by layers and traces of pellet-size charcoal fragments in the clay. Mineralogically, the material resembles the fill in the breakdown and consists mostly of quartz with some sandstone fragments in the coarser size fractions. This material must have originated outside the cave and, like the filling in the interstices of the breakdown, must have been washed in by floods. The maximum level of flooding observed in the last few years is 617.5 feet. But it is likely that occasionally higher floods occurred, and during the early occupation the level of annual floods might have been slightly higher than now. Thus Layers G and F are interpreted as having been deposited during a time of intermittent human occupation when the inhabitants built fires on the irregular floor of the shelter. The ash heaps became mixed with or buried in sediments washed in during high floods. Leveling by the inhabitants in low-water periods further mixed the deposits. At the end of this period of occupation or at the beginning of the next, the top of Layer F was leveled off. The deposits above Layer F show no evidence of flooding.

#### *Layer E*

The character of the fill changes at the base of Layer E. This layer is horizontally bedded, contains numerous fire pits, and is not cross bedded as though built up in place. Its texture is sandy, and 70 percent or more is soluble in hydrochloric acid (table 3). Mineralogically, the material is mostly calcite, though a small amount of quartz is present. As seen under the binocular microscope, the sand and silt sizes are partly limestone fragments and include whole oölites derived from the limestone. Most of the calcite, how-

ever, is in the form of minute chalky white fragments, some of them tubular. This material is believed to be travertine derived from the roof of the rock shelter. The roof is smooth and has few stalactites. Patches of a light-gray efflorescence that resembles fluffy wool are observed in places on the ceiling and walls. These are also travertine and under 50-power magnification are seen to be irregular rods or tubes that closely resemble stalactites or helictites. Since the rock is porous, the minute travertine rods probably form as emerging moisture evaporates or loses carbon dioxide, in the same manner as do stalactites. The woolly mass evidently does not accumulate on the ceiling in great thickness but drops off onto the floor. The presence of oölites in the floor deposits indicates that small fragments of the roof itself spall off, probably dislodged by the force of crystallization. The process must be very slow, as less than 5 feet have accumulated on the floor in this way since the formation of the lower part of Layer E, estimated by radiocarbon determinations to be 5,500 years old.

#### *Layer D*

This layer is one-half foot to 1 foot thick. It is disconformable on Layer E and is distinctive because it contains many fragments of limestone of pebble size that can be traced around the walls of the excavation. The percentage of calcite in the material is smaller (lower) than in Layer E and, as shown by the amount that is soluble in hydrochloric acid, is less than 40 percent (table 3). Clay makes up almost a fourth of the material, and quartz is the most abundant mineral. Fragments of travertine are present but in small amount. X-ray examination of the clay fraction shows that it contains several other clay minerals, such as chlorite, vermiculite, and mixed-layered mica. These minerals were also found in X-ray examination of soil collected from the slopes outside the cave as well as from the flood deposits of Dry Creek. It appears, therefore, that Layer D is composed at least in part of material derived from outside the rock shelter, and it may have been brought in and spread by the inhabitants.

#### *Layers B and C*

These upper layers closely resemble Layer E, both mechanically and mineralogically. They are dominantly calcite, which is mixed with charcoal, cultural detritus, and some quartz.

### Mineralogical Description of Samples

#### *Sediments Filling Interstices*

Five samples of fine-grained deposits were collected from the breakdown in the original trench. They were collected in 1961 and were studied in the laboratory by Dr. Dorothy Carroll and Larry K. Hawkins. All of these samples, except number 4, were composed principally of quartz, but they also contain limestone fragments in the fractions larger than 8.062 mm. (table 3). The minerals of clay size in addition to quartz and calcite included small amounts of kaolinite, mica, montmorillonite, and, in some samples, chlorite and vermiculite. Sample number 4 was almost entirely weathered limestone and consisted of calcite with a small amount of montmorillonite and quartz. The high quartz content of most of the samples indicates unequivocally that they were derived from deposits originating outside the rock shelter. The limestone of the roof and breakdown does contain some quartz but it is minor in amount. Except for a slightly higher silt content, sample 3, in particular, is mechanically and mineralogically almost identical with sample 8, collected from the bed of Dry Creek.

#### *Material Above Breakdown*

Seventeen samples were collected from the cave fill above the breakdown. Since 12 of the samples were collected in 1962 from the fresh wall of the final excavation and are tied stratigraphically to the layers of occupational debris, they are described individually. The other five samples collected from the old trench are not described, but they are similar in composition to the samples that appear to be from equivalent layers. The 1962 samples were treated as follows (Larry K. Hawkins, written communication, 1963):

"Grain size distribution studies (table 3) were made by dispersing the sample in 1100 ml cylinders of water containing 10 ml of NH<sub>4</sub>OH. The clay fraction (less than 2 microns) and silt fraction (2 to 62 microns) were separated by settling and centrifugation. The sand fraction (larger than 62 microns) was sieved in a set of U.S. Standard sieves. Results are expressed in weight percent. Minerals in the sand fraction were identified optically. The clay minerals in the finer fractions were identified by X-ray diffraction. The insoluble residue (table 3) was determined after treating the samples in (1:1) HCl. Results are expressed in weight percent."

**No. 94-A.** Elevation 615.1 feet, east face Square A (fig. 11). The fractions larger than 0.25 mm. are predominantly limestone fragments with some travertine, shell fragments, and rounded sandstone fragments. The clay fraction, studied with X-ray techniques, is predominantly quartz, with some calcite and possibly a small amount of mica.

**No. 94-B.** Elevation 615.3 feet, south face of Square N. Similar to 94-A but the coarser fractions are dominantly shell fragments and rounded sandstone grains, with limestone fragments subordinate. Fractions smaller than 0.25 mm. are mostly detrital quartz, with some sandstone grains. The clay fraction, examined by X-ray, is dominantly quartz with some calcite, but it also contains mixed-layered mica and possibly chlorite and vermiculite.

**No. 95-A.** Elevation 617 feet, from Layer G, east face of Square S. Fractions larger than 0.5 mm. are dominantly limestone fragments, with rounded sandstone fragments and shell fragments. Detrital quartz dominates in the fractions 0.25 mm. in diameter and smaller, with sandstone grains and charcoal fragments in smaller amounts. The clay fraction, examined by X-ray, is mostly quartz with some calcite and possibly mica.

**No. 95-B.** Elevation 618.2 feet, from Layer G, east face of Square G. Similar to 95-A.

**No. 95-C.** Elevation 620.2 feet, from near the top of Layer F, east face of Square M. This sample is similar to 95-A and 95-B, but limestone fragments predominate only in the fraction larger than 2 mm. Rounded sandstone grains, most of them cemented with iron oxide, dominate in the sizes between 0.25 and 2.0 mm. The finer fractions are mostly detrital quartz grains with some sandstone. The clay fraction, examined by X-ray, is mostly quartz, with subordinate calcite and possibly some mica.

**No. 96-A.** Elevation 621.2 feet, from Layer E, east face of Square M. The fractions coarser than 0.25 mm. are mostly limestone and travertine fragments, with some bone and reddish material that appears to be burned limestone. Charcoal is abundant. The finer fractions are mostly travertine with subordinate grains of quartz. In the clay fraction, examined by X-ray, calcite is more abundant than quartz.

**No. 96-B.** Elevation 621.4 feet, from Layer E, east face of Square M. On the face of the excavation this material appears loose and fluffy and looks like wood ash. Mineralogically, however, it proves to be similar to 96-A but lacks the charcoal. The coarsest

fractions down to 0.125 mm. are limestone with some travertine, whereas the finest fractions are crystalline calcite. The clay fraction, examined by X-ray, is dominantly calcite with some quartz.

**No. 96-C.** Elevation 621.0 feet, from Layer E, east face of Square A. The coarser fractions are mostly travertine with some charcoal. Finer fractions are predominantly travertine. Quartz is present but very subordinate. The clay fraction, examined by X-ray, is predominantly calcite, with some quartz and possibly mixed-layered mica.

**No. 97-A.** Elevation 622.4 feet, from Layer D, east face of Square M. Fractions coarser than 0.5 mm. are dominantly limestone fragments with some travertine, sandstone grains, and charcoal. The clay fraction, examined by X-ray, contains quartz and calcite with quartz dominant, but also with other minerals including mixed-layered micas with chlorite and possibly vermiculite.

**No. 97-B.** Elevation 621.6 feet from Layer D, east face of old trench, 6 feet north of Square AA. This sample is very similar to 97-A, with limestone and travertine dominating the coarsest fractions but with quartz dominating the fine fractions. The clay fraction is also similar to 97-A, but chlorite is less evident.

**No. 98-A.** Elevation 623 feet, from Layer C, east face of Square M. The coarse fractions larger than 1 mm. are limestone, shell, and charcoal. The sizes, from 0.062 to 1 mm., are charcoal, travertine, limestone, crystalline calcite, and some detrital quartz. The clay, examined by X-ray, is mostly calcite with subordinate quartz. Some mixed-layered mica may be present.

**No. 98-B.** Elevation 624.5 feet, from Layer B, south face of Square A. Similar in every respect to sample 98-A.

## Summary and Conclusions

The rock shelter at Russell Cave is one of two entrances to a long underground cave system that carries most of the runoff from the upper part of Doran Cove. There is a large flat area on the valley floor east of the cave formed by ponding of the flood waters at times of high discharge when the cave is unable to carry all the runoff. Evidence, such as terrace levels graded to the cave and stream deposits within the rock shelter, indicate that these conditions existed at Russell Cave before the time of human occupation. The shelter was then much deeper than

at present and, though its ceiling was lower, the floor was at least 30 feet below the level of the present floor. Collapse of the roof occurred, large blocks fell from the ceiling and walls, and sand and silt, carried in by floods, were deposited in open spaces and low places in the bouldery breakdown. By 9,000 years ago, the level of the cave floor had risen to a point only 8 or 9 feet below the present floor.

The date 9000 B.P. corresponds closely to the end of a period of pronounced climatic warming that is abundantly recorded in the northern United States. Some 11,000 years ago the Valders ice sheet covered most of the Great Lakes region. By 9000 B.P., however, the glacier had retreated from most of the northeastern United States and the ice sheet no longer acted as a dam on any of the Great Lakes (see the chronology of Hough, 1958, 1963). This climatic change is recorded closer to Russell Cave by pollen from bogs on the North Carolina Coastal Plain that have been studied by Frey (1953). The spectrum changes from abundant spruce pollen and spores of isoetes, a water plant of northern lakes, to a spectrum containing a large variety of more temperate species including oak, pine, hickory, holly, beech, and cypress. (See Wright, 1971, for a summary of recent palynological work in the southeastern U.S.) Probably the Russell Cave area was quite

cold 11,000 to 12,000 years ago. Under the conditions then existing, the solution of limestone and the collapse of the roof at the cave entrances because of frost action could have proceeded very rapidly.

After about 9000 B.P., the fall of large blocks from the ceiling of the rock shelter virtually ceased, though a few boulders are buried in the deposits that contain cultural remains. From about 9000 B.P. to 5500 B.P. (lower part of Layer E), the floor of the cave was slowly built up and the cave was occupied at least intermittently. The most important process of deposition was the accumulation of silty flood debris that came in, in small amounts, with each flood of Dry Creek and became mixed with charcoal and cultural remains. Eventually the level of the floor rose to a height above even the highest floods. From then until the present, the cave floor has continued to rise because of a gradual rain of minute travertine fragments, oölite grains, and small rock particles from the ceiling. Layer D, an intermediate layer in this sequence, dated at about 2100 B.P., is different from the others: it consists predominantly of clay minerals and quartz, and it resembles soil on the slopes outside the cave or the flood deposits of Dry Creek. This material may have been brought in by the occupants of the cave to level or tidy up the cave floor.

# PART 3: MATERIAL CULTURE

*John Earl Ingmanson*

*John W. Griffin*

This section describes the artifacts recovered in our excavations and accounts for their distribution within the layers defined in the Introduction. Interpretation of the specimens, other than stratigraphic, is held to a minimum here inasmuch as it is dealt with by John Griffin in the last two sections of this volume.

The ceramics and the projectile points are treated in greater detail than the other artifacts since they occur in greater quantity and generally register, more clearly, cultural change through time. Indeed, our cultural characterizations of the several layers rest largely on these two categories of objects, with other kinds of artifacts tied to them wherever possible.

We were struck while in the field with the virtual absence of axes and celts. No axes, either chipped or ground, were encountered by us, and no celts were found in context. Two fragments of ground stone which may have come from celts were found under conditions which precluded placing them in stratigraphic context, and later a complete celt was found while preparing the excavation for interpretative development. But grooved axes are illustrated by Miller (1958, p. 436).

Also virtually absent was direct evidence of the use of the atlatl. A probable atlatl weight from the Late Archaic was the only specimen noted. We found no bone or antler atlatl hooks despite the excellent preservation of these materials in the site. Another absence worthy of note was that of socketed antler projectile points. These artifacts, of rather common occurrence in the East, were not represented in our dig. However, both atlatl hooks and antler points are figured by Miller (*ibid*, p. 434).

The fact that we did not find certain items in our excavation, whereas they did appear in another sample from the same site, should be taken as fair warning against drawing unqualified conclusions from negative evidence.

## Ceramics: Taxonomy

Our collection of excavated pottery consisted of

13,078 sherds. Surface sherds and those recovered from the slumped edges or backfill of previous excavations are not included in this total and were not utilized in the analysis. No complete or restorable vessels resulted from our excavations, but several vessels were recovered by Miller.

All the sherds could be classified according to previously defined types (table 4), with some minor qualifications to be mentioned below. It is immediately apparent that we are dealing with an overwhelmingly limestone-tempered ware. Less than 1 percent of the total consists of sherds from the other four temper wares known in the Tennessee Valley. Furthermore, 77 percent of the sherds are of a single type, Mulberry Creek Plain. In fact, almost 97 percent of the sample can be assigned to four types—Mulberry Creek Plain, Long Branch Fabric Marked, Wright Check Stamped, and Complicated Stamped. Only one other type, Flint River Brushed, reaches 1 percent of the total.

TABLE 4.—Classification of excavated sherds,  
Russell Cave.

Type	Wares and Types		Motifs	
	Count	Percent	Count	Percent
Fiber-tempered	1	0.01		
Sand-tempered	2	0.02		
Limestone-tempered				
Mulberry Creek Plain	10,150	77.00		
Long Branch Fabric Marked	1,281	9.80		
Wright Check Stamped	752	5.70		
Bluff Creek Simple Stamped	35	0.30		
Complicated Stamped	535	4.10		
Napier motifs	218	1.66		
Woodstock motifs	33	0.25		
Line Block motifs	83	0.65		
Swift Creek motifs	156	1.19		
Miscellaneous Complicated Stamped	45	0.35		
Sauty Incised	33	0.30		
Flint River Cordmarked	10	0.10		
Flint River Incised	1	0.01		
Prospect Red Filmed	1	0.01		
Flint River Brushed	150	1.10		
Candy Creek Cordmarked	1	0.01		
Miscellaneous decorated	30	0.30		
Clay-grit-tempered				
McKelvey Plain	1	0.01		
Shell-tempered				
Plain	90	0.80		
Decorated	5	0.05		
Totals	13,078	99.62		

Another point to be considered is the percentage of rim sherds in a given type. As the type descriptions will show, many of the stamped types bear decoration only in a band below the rim. It is logical to assume that these types will disclose a relatively high percentage of rim sherds, and this is found to be the case, as follows:

Mulberry Creek Plain	4 percent rims
Long Branch Fabric Marked	5 percent rims
Flint River Brushed	10 percent rims
Wright Check Stamped	21 percent rims
Complicated Stamped	29 percent rims

Clearly, the latter two types, the decoration of which is confined preponderantly to a band below the rim, are represented by a relatively high percentage of rim sherds when compared to the first three types, which are known to occur usually with an overall surface treatment. Mulberry Creek Plain has the lowest percentage of rim sherds, suggesting that the type includes many plain body sherds from the types with restricted areas of decoration. This fact should be borne in mind when the ceramic stratigraphy of the site is discussed later on.

The composition and percentages of our total sample compare favorably with the smaller sample described by Broyles (1958), although there are some differences. Her sample, too, was 99 percent limestone-tempered, with Mulberry Creek Plain being overwhelmingly dominant. Over 73 percent of the more than a quarter of a million sherds analyzed from the sites excavated in the Guntersville Basin were limestone-tempered, despite the fact that a number of sites contained heavy Mississippian occupations (Heimlich, 1952, p. 58).

### Limestone-tempered Ware

This ware of northern Alabama and adjacent areas has been described by Haag (1939; 1942, p. 516) and by Heimlich (1952, pp. 15-17). As Heimlich notes, the temper, paste, and surface finish are remarkably uniform throughout the entire range of types which appear in this group.

The authors referred to describe this pottery as having a well-consolidated paste, heavily tempered (10 to 30 percent of mass) with crushed limestone fragments averaging about 1 mm. in diameter. The texture is medium-fine. The sherds are well smoothed on both surfaces, with the outer surface often showing tool markings. While burnishing of the surfaces

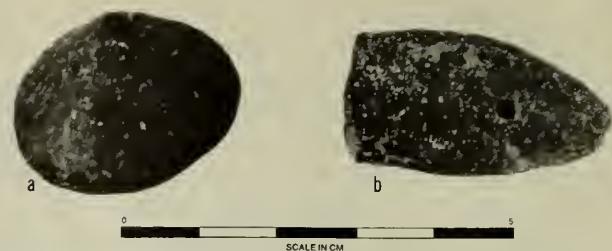


Figure 24.—Biconical bead, a, and effigy head, b, of limestone-tempered pottery.

is common in the ware as a whole, this feature is particularly marked in the specimens from Russell Cave, which have been protected by the nature of the site from weathering of the surfaces and leaching out of the temper. Naturally, these surface characteristics are not seen on sherds with fabric-marking or stamping to the extent that they are on plain sherds.

Tetrapodal bases are mentioned as present in this ware by both Haag and Heimlich, and Broyles (1958, p. 3 and fig. 2) describes them in her sample from Russell Cave. Only three, each representing a different name type, were found in our collections.

Two items of plain limestone-tempered pottery deserve comment. One is a small effigy head of what appears to be a reptile (fig. 24b). It has punctated eyes, and also punctated nostrils which do not show in the illustrations. The mouth is represented by an incised line. The specimen is broken at the neck region. Whether this was an effigy lug on a vessel or a separate effigy figure cannot be determined. The head was found in Layer B, placing it late in the Woodland sequence at Russell Cave.

The other specimen (fig. 24a) is a clay bead, which was found in the Woodland pit (P 12 Pit) for which a radiocarbon date of about A.D. 450 was obtained. The diameter is 3 cm., the height only a fraction less. Seen from the side, the bead is symmetrically biconical.

### Mulberry Creek Plain

This type was defined by Haag (1939; 1942, p. 516) and Heimlich (1952, pp. 15-17). The Russell Cave specimens fall well within the type descriptions. However, both Haag and Heimlich indicate that the folded rim is infrequent in the type as a whole, but it is quite common at Russell Cave. Broyles (1958, p. 3) reported that 42.6 percent of all rims of Mulberry Creek Plain were folded. A sample of 202 rim

TABLE 5.—Distribution of rim shapes, Mulberry Creek Plain, Russell Cave.

Totals	Not Folded		Folded Rim		Layer
	Count	Percent	Count	Percent	
B	40	50.5	39	49.5	79
C-1	29	52.75	26	47.25	55
C-2	11	30.5	25	69.5	36
D	8	25.0	24	75.0	32
Totals	88	43.5	114	56.5	202

sherds of this pottery type from our excavations yielded an almost identical percentage of 43.5 (table 5). The sample was plotted to see if there were differences in the occurrence of folded rims by layer, and the table discloses that this treatment increased in popularity in the upper portion of Layer C (C-1) and in Layer B.

Five examples of flat bases came from Layer C. The largest of these was about 2 3/4 inches in diameter. The smaller examples have sides that flare out from the base at about a 45° angle, suggesting a somewhat extreme flower-pot shape. One podal support of this type was found.

#### Long Branch Fabric Marked (fig. 25a and b)

This fabric-marked, limestone-tempered type has been described by several authors (Haag, 1939; Sears and Griffin, 1950; Heimlich, 1952). Haag (*op. cit.*) states that the highly characteristic surface texture of this type is produced by "fabric impressions of close weft and wide warp, including plain plaited basketry impressions." In this, he is followed by the other authors cited. Kneberg (1962, pp. 36–38) disputes this interpretation, asserting that the surface markings were produced not by fabric impressing but by a cord-wrapped paddle.

The entire surface of vessels of this type is covered with the characteristic roughening marks, including the single podal support found. Sherd s of this type tend to be somewhat thinner than those of other limestone-tempered types at Russell Cave, and folded rims do not occur.

#### Wright Check Stamped, var. Russell Cave (fig. 25c–e)

This type has also been described by Haag (1939) and Heimlich (1952, pp. 17–18). It was set up to include all check stamped pottery with limestone temper from northern Alabama, and it covers a wide range of stamping. Both authors describe the stamping as overall, and they note the presence of

tetrapodal supports and handles. We found no handles and only one podal support. The latter was stamped, and it is our only clear example of overall check stamping at Russell Cave.

The outstanding feature of the vast majority of the Wright Check Stamped type at Russell Cave is that the stamping is confined to a band on the upper portion of the vessel. Since this apparently is not a feature of the type as a whole, we have designated our specimens as a variety of the type.

#### Complicated Stamped

Haag (1939) and Heimlich (1952, p. 18) define a type called Pickwick Complicated Stamped, which includes all varieties of complicated stamping on the limestone-tempered ware from northern Alabama. It is easy to see why this was done; in the 22 sites in the Guntersville Basin which were tabulated by Heimlich (*ibid.*, pp. 52–57), this type is represented by only 717, or 0.37 percent, out of a total of 194,803 limestone-tempered sherds. At Russell Cave, on the other hand, complicated stamped pottery accounts for slightly more than 4 percent of our excavated sample, causing us to look at these sherds in some detail.

Broyles (1958, p. 3) found an even higher percentage (7.4) of complicated stamped sherds in her sample from Russell Cave. Although she retained the type name, Pickwick Complicated Stamped, she had reservations about its utility as such and separated the sample into motifs (*op. cit.*, p. 9).

Our excavated sample of 535 sherds revealed stamped motifs which could readily be compared to named types in Georgia where complicated stamping is a far more prevalent feature. The Georgia types are of a sand-tempered ware, whereas the Russell Cave specimens are limestone-tempered. Therefore, in using the Georgia names, we are referring only to the motifs and not to formal type designations. Forty-five of our sherds were not included in the four named groups; most of them are either too small or too indeterminate to classify. The groups are: Napier motifs (fig. 26a–c), Woodstock motifs (fig. 26d–f), Line Block motifs (fig. 26g–i), and Swift Creek motifs (fig. 26j–l).

The majority of the complicated stamped pottery shares with Wright Check Stamped the feature of restriction of the stamped impression to the upper portion of the vessel. This shared feature implies a close relationship among the stamped pottery at this site. However, it is noted that Miller (1962) has

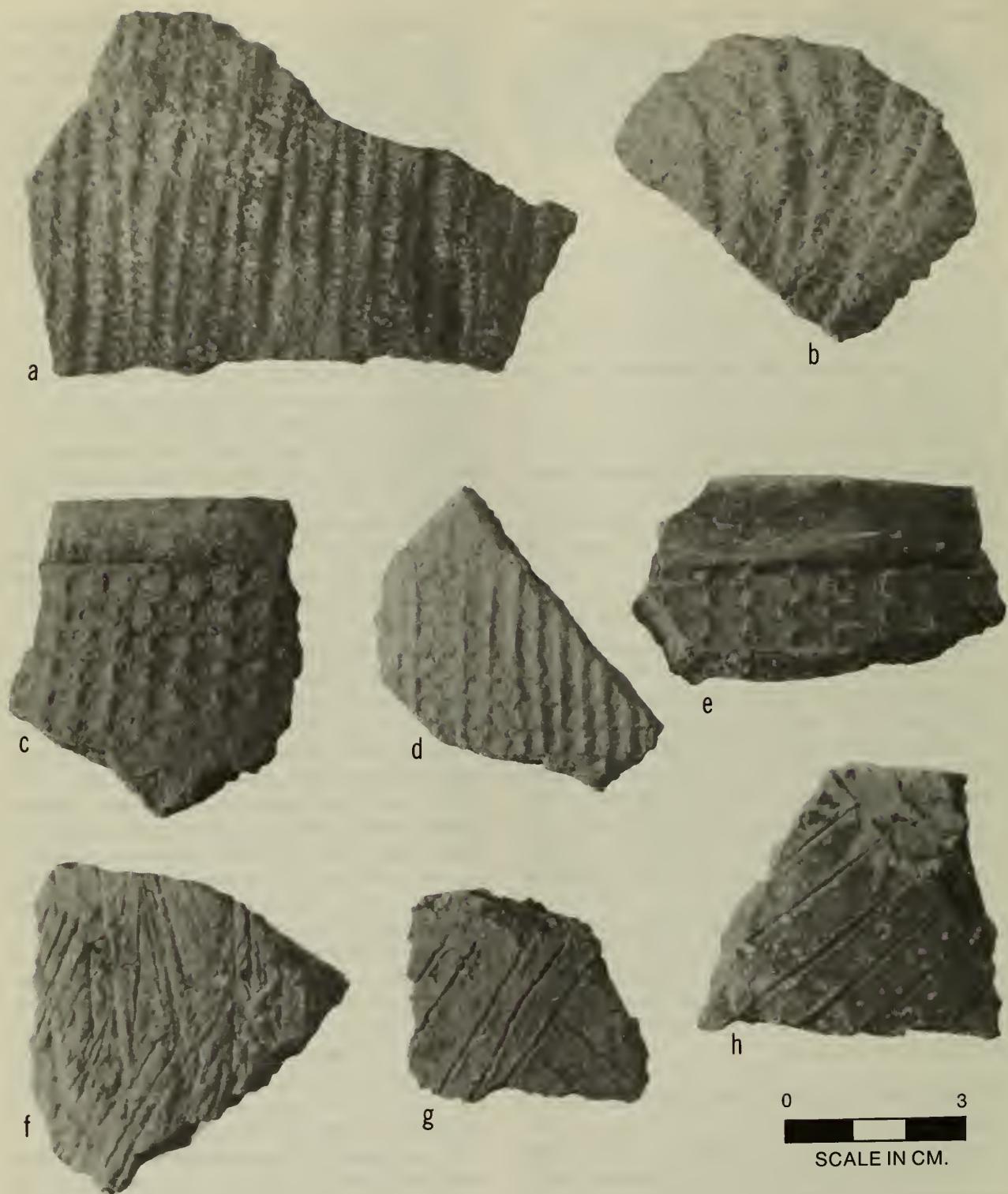


Figure 25.—Sherds of four named pottery types: Long Branch Fabric Marked, a and b; Wright Check Stamped, c-e; Flint River Brushed, f; and Sauty Incised, g and h.

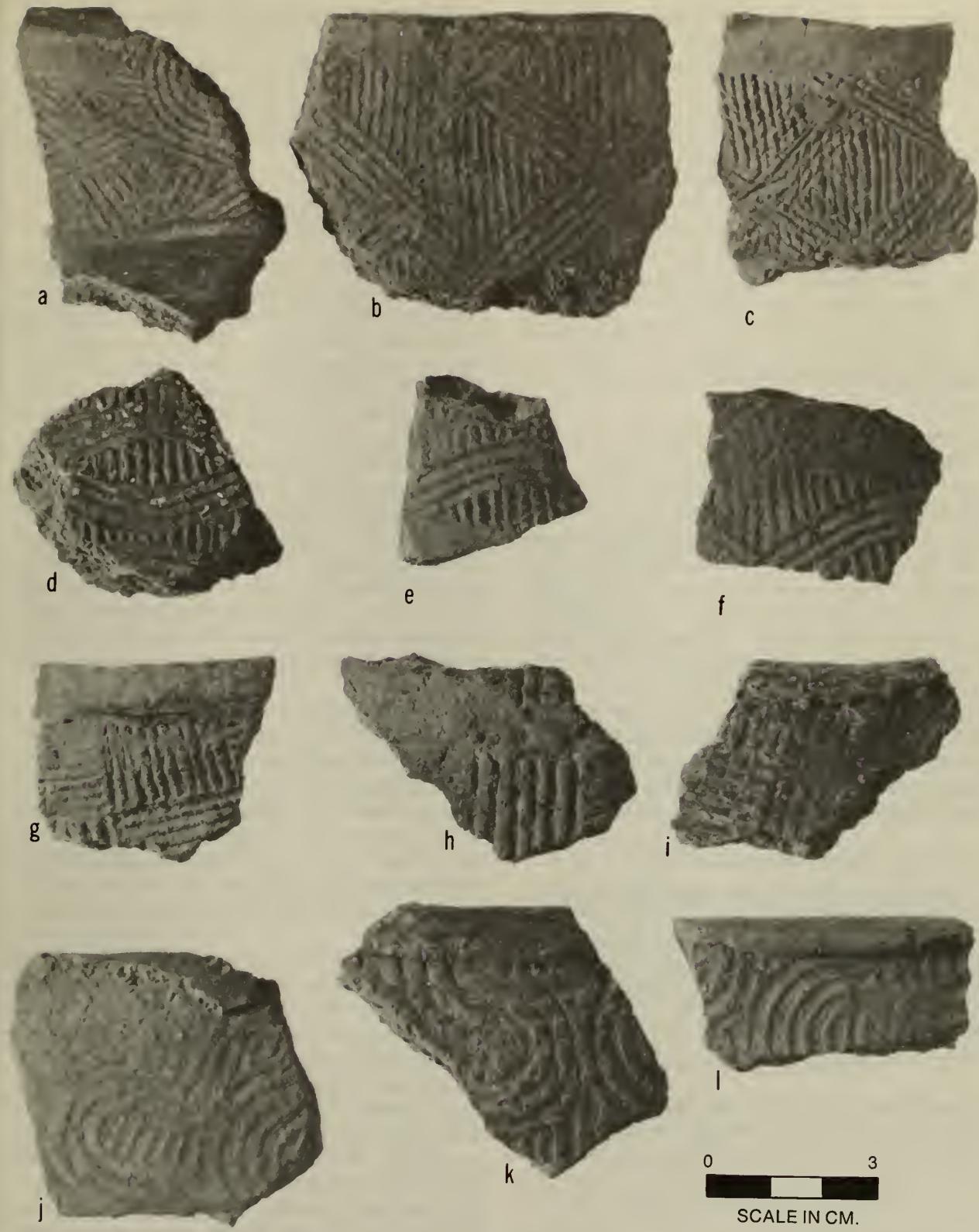


Figure 26.—Sherds of four named motifs: Napier, a-c; Woodstock, d-f; Line Block, g-i; and Swift Creek, j-l.

described a nearly complete vessel with Napier motifs in which the rim and neck are plain and the body of the vessel is stamped in an overall manner.

#### *Flint River Brushed (fig. 25f)*

This type, defined by Heimlich (1952, p. 20), is characterized by an overall roughening of the surface, as by a bundle of small twigs or fibers. The 150 sherds in our sample conform to the type description. While this is definitely a minority type at Russell Cave, it is found in relative abundance at certain sites in the Tennessee Valley, including some in the Guntersville Basin. It can be demonstrated to be late in the limestone-tempered sequence of the area, and the implications of its meager representation at Russell Cave will be discussed under ceramic stratigraphy.

#### *Other Limestone-tempered Types*

Five other limestone-tempered types were recognized in our sample. Taken together, they represent only 0.73 percent of our total sample. In all instances they seem to conform to the published type descriptions, but our sample is too small to merit detailed comment. In the case of three types, only one specimen of each was recognized (table 4). The five types are: Bluff Creek Simple Stamped (Haag, 1939; Heimlich, 1952, p. 18), Sauty Incised (Heimlich, op. cit., p. 19), Flint River Cordmarked (Heimlich, op. cit., p. 19), Flint River Incised (Heimlich, op. cit., p. 19), Prospect Red Filmed (Heimlich, op. cit., p. 19), and Candy Creek Cordmarked (Lewis and Kneberg, 1946, p. 83). Two sherds of Sauty Incised from Russell Cave are illustrated in figure 25g and h.

#### *Fiber-tempered Ware*

A single small sherd of fiber-tempered pottery was found by us under circumstances which preclude its placement by level. Broyles (1958) found none in her sample from the cave. In view of the geographical location of Russell Cave, we can probably consider this sherd to be Wheeler Plain.

#### *Sand-tempered Ware*

Sand-tempered pottery was also extremely rare, being represented by only two sherds. Broyles (1958, p. 3) also noted but two sand-tempered sherds.

#### *Clay-grit-tempered Ware*

The single sherd of this ware is classifiable as McKelvey Plain (Heimlich, 1952, p. 21).

#### *Shell-tempered Ware*

Late Mississippian shell-tempered pottery was represented in our collection by 90 plain and five decorated sherds. The sherds appear to be the Plain Shell type of the Guntersville Basin (Heimlich, 1952, pp. 26-27).

#### *Ceramics: Stratigraphy*

The provenience of the pottery sherds in our excavated squares was tabulated according to the seven units of occupational debris, or layers, or according to arbitrary 6-inch levels. Certain of the larger pits were treated separately. In some squares, the 6-inch levels were correlated by means of profiles and field notes with the sequence of layers to make the analysis uniform.

Study of the results of this analysis and of the profiles and notes made it abundantly clear that certain squares, presenting highly mixed samples, had to be omitted in the compilation of the final results. Inevitably, dirt brought up in digging the aboriginal pits became scattered over the living surface and, in the process, lower-level sherds were distributed at higher levels. As indicated in the Introduction, it was not possible to determine all sources of artifacts intruded downward.

Seven squares, B to E and H to J, containing a total of 6,867 sherds, were finally selected as representing the clearest picture of the ceramic stratigraphy at Russell Cave. The results are given in table 6.

It is immediately evident that the shell-tempered pottery clusters near the top of the excavation, exactly where it should. All the remaining sherds are limestone tempered, and it is the stratigraphic relationships of these types that is our major concern at this point.

Only 294 sherds came from below Layer D, and the majority of these (240 sherds) were found in three squares. This situation confirms the hypothesis set up during excavation that Layer D was truly the lowest pottery-bearing horizon.

The percentage distribution of types suggests that the sherds below Layer D have, for the most part, been intruded from above. Except for the higher percentage of Long Branch Fabric Marked, this sample most closely resembles the one from Layer C. The higher frequency of Long Branch Fabric Marked can be accounted for in at least two ways. We experienced some difficulty in separating Layers

TABLE 6.—Distribution of pottery sherds, Russell Cave.

Type	Layer A		Layer B		Layer C		Layer D		Below Layer D		Totals	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
<b>Limestone-Tempered</b>												
Mulberry Creek Plain	410	86.32	1,941	88.15	2,332	85.00	462	39.50	203	69.04	5,348	77.87
Long Branch Fabric Marked	14	2.95	31	1.41	81	2.96	565	48.15	60	20.40	751	10.90
Wright Check Stamped	20	4.20	79	3.58	156	5.72	104	8.90	18	6.12	377	5.48
Bluff Creek Simple Stamped			13	0.59	4	0.18	7	0.60			24	0.35
Complicated Stamped (all)	(17)	(3.58)	(64)	(2.90)	(119)	(4.36)	(26)	(2.23)	(10)	(3.40)	(236)	(3.42)
Napier motifs	2	0.42	25	1.17	44	1.61	6	0.53	6	2.03	83	1.21
Woodstock motifs	3	0.63			13	0.48	1	0.09			17	0.25
Line Block motifs	2	0.42	12	0.55	23	0.84			2	0.68	39	0.57
Swift Creek motifs	6	1.26	23	1.09	30	1.10	18	1.54	2	0.68	79	1.15
Misc. complicated stamped	4	0.84	4	0.18	9	0.33	1	0.09			18	0.26
Sauty Incised			6	0.27	5	0.18					11	0.16
Flint River Cordmarked					5	0.18			2	0.68	7	0.10
Flint River Brushed	4	0.84	38	1.73	18	0.66	1	0.09	1	0.34	62	0.90
Miscellaneous decorated	3	0.63	2	0.09	3	0.11	3	0.26			11	0.16
<b>Shell-Tempered</b>												
Plain	5	1.05	27	1.22	5	0.18					37	0.53
Decorated	2	0.42	1	0.04							3	0.04
Totals	475	99.98	2,202	99.98	2,728	99.53	1,168	99.75	294	99.98	6,867	99.91

D and E in certain squares, and sherds attributed to Layer E could actually have come from the base of Layer D. Also, the intrusion of pits from Layer C could have displaced some Layer D sherds downward.

The sherds taken from P12 Pit and Pit J (table 7) clearly demonstrate the Layer C character of certain intrusions below Layer D.

Considering all factors, we believe that Layer D is the locus of the earliest *in situ* pottery in Russell Cave.

The pottery of Layer D is dominated by Long Branch Fabric Marked, with nearly 50 percent of the sherds being of this type. We may also note that about 75 percent of the sherds of this type are from Layer D, indicating further that this is truly the locus of the type at Russell Cave.

Unless Layer D had been more seriously disturbed in these squares than we believe it was, Mulberry Creek Plain was present at this time in considerable quantity. Above Layer D, however, the type is overwhelmingly dominant.

Wright Check Stamped is the only other type that appears in any appreciable amount in Layer D, where it accounts for nearly 9 percent of the total. This is the highest percentage for the type, but it is represented in somewhat greater numbers in Layer C.

The complicated stamped pottery has its highest percentage in Layer C, with only the Swift Creek motifs showing a higher percentage in Layer D.

We may have a situation here in which check stamping and the curvilinear Swift Creek style first appear in the Early Woodland of Layer D, where they would not be temporally out of place consider-

TABLE 7.—Sherds from P12 Pit and Pit J, Russell Cave.

Type	P12 Pit		Pit J	
	Count	Percent	Count	Percent
Mulberry Creek Plain	299	84.50	42	76.36
Long Branch Fabric Marked	10	2.84	3	5.45
Wright Check Stamped	32	9.10	6	10.90
Napier motifs	5	1.42		
Line Block motifs			2	3.63
Swift Creek motifs	3	0.85	2	3.63
Sauty Incised	2	0.57		
Flint River Brushed	1	0.28		
Miscellaneous decorated	1	0.28		
Totals	353	99.84	55	99.97

ing the general Southeastern picture. They continued to be made into the next period, where they were joined by the straight-line complicated stamped motifs, which taken together outnumber the Swift Creek motifs in Layer C by 2 to 1.

Flint River Brushed has its highest percentage in Layer B, which is in keeping with the known late position of the type in the limestone-tempered ware of the Guntersville Basin (Heimlich, 1952, p. 37).

Those who are familiar with the general sequence of the Guntersville pottery types as presented by Heimlich (1952, Pl. 10) will not find our stratigraphy inconsistent. We will reserve several remarks on the general sequence, however, for a later section of this volume.

It would appear that Layers B, C, and D possess cultural validity. Layer D, which was the most easily recognized of any physical unit in the cave, is characterized by the dominance of Long Branch Fabric Marked. We may call this an Early Woodland occupation.

Layers B and C were less easily distinguished, one

from the other, in terms of their physical appearance, but taken together they are clearly distinguishable culturally from Layer D. Both are marked by a very high percentage of Mulberry Creek Plain. Complicated stamped and check stamped sherds occur in both layers, and the percentage differences do not seem to be significant. However, all stamped types have their maximum occurrences in Layer C. Layer B has by far the highest percentage of Flint River Brushed, as well as the maximum concentration of this type. Shell-tempered pottery is also at its peak here, and its presence in a situation where it cannot be stratigraphically segregated reminds us once again of the mechanical mixing and blending that takes place in stratified sites.

For convenience, we are calling Layer C simply Woodland and are referring to Layer B as Late Woodland, while recognizing that it also contains some Mississippian elements.

### Projectile Points: Taxonomy

The chipped stone projectile points from our excavations were classified by James W. Cambron in April 1963, according to the types and categories published in the *Handbook of Alabama Archaeology* (Cambron and Hulse, 1964). Cambron had previously classified the points from the Stanfield-Worley Bluff Shelter (DeJarnette, Kurjack, and Cambron, 1962), as well as those from various other Alabama sites, and his contribution to the present study makes the material directly comparable to a considerable body of data from this region.

It is of interest to note that the points were not presented to Cambron in stratigraphic order; he dealt with them at random as they were unwrapped, assigning them individually to the previously established categories. Later we organized the points by excavation units (layers) and tabulated the results of his identifications. Most of the types and categories fell into relatively restricted time periods within the site, lending considerable support to the classification.

Fifty-eight named types, six provisional categories, and two residual categories were utilized in the analysis (table 8). Twenty-three of the 58 types were represented by one specimen each, and the other 35 types were represented by less than five examples each. With a single exception, the types have all been described in the Alabama handbook (Cambron and Huse, 1964), and descriptions will not be repeated

here. Cambron's description of the new type, Russell Cave point, follows.

### RUSSELL CAVE POINT (Code No. A 117)

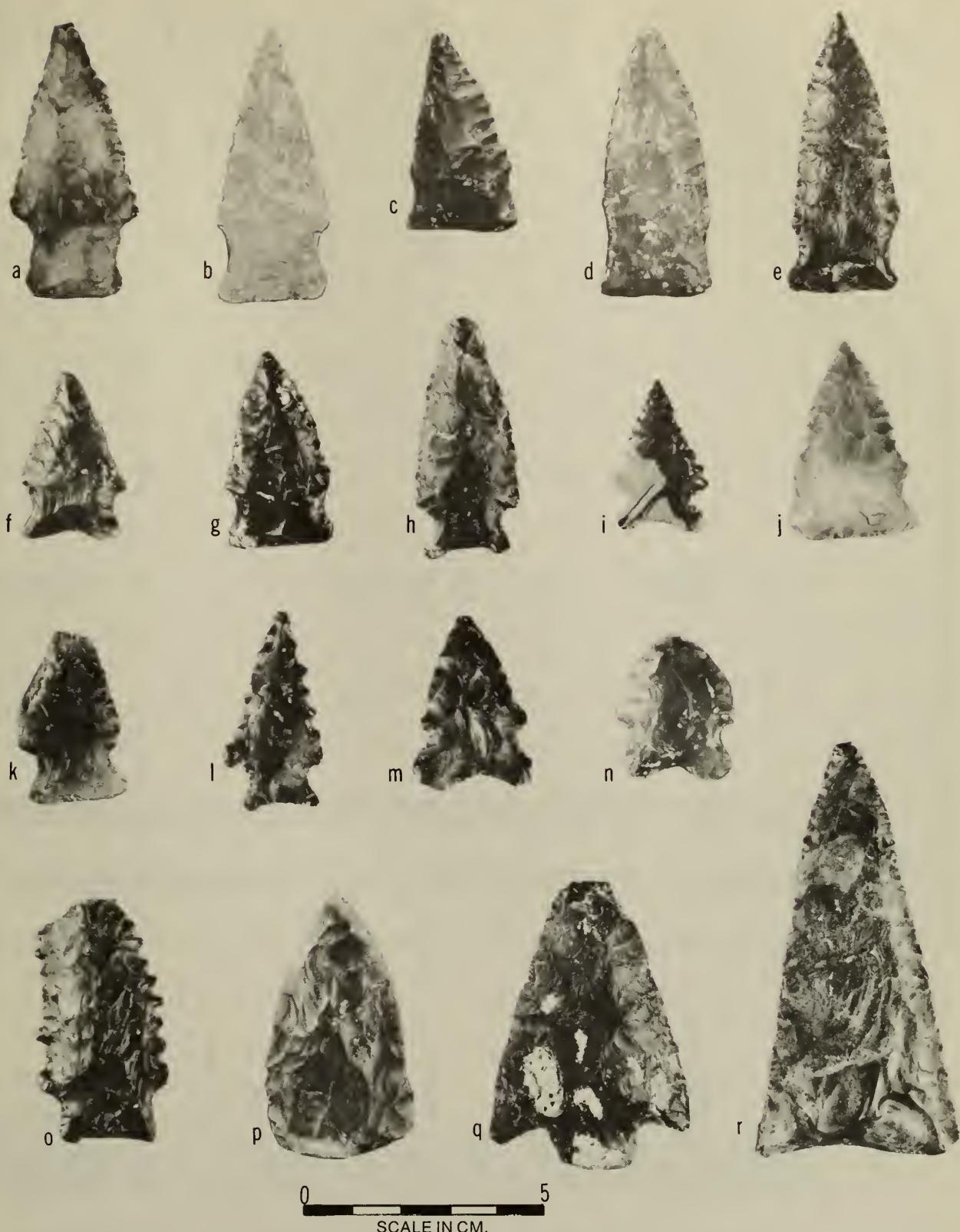
*General Description:* The Russell Cave point is a medium-sized, expanded-stem point with blade edges straight and shallowly serrated.

*Measurements:* Eight examples (see illustrated specimens, fig. 27a-d) from lower Layer G at Russell Cave in northern Alabama, provided the following measurements and features: length—maximum, 6.0 cm., minimum, 4.4 cm.; average, 5.4 cm.; shoulder width—maximum, 2.8 cm.; minimum, 2.1 cm.; average, 2.5 cm.; stem width at base—maximum, 2.4 cm.; minimum, 2.1 cm.; average, 2.3 cm.; stem width at narrowest point—maximum, 2.1 cm.; minimum, 1.9 cm.; average, 2.0 cm.; stem length—maximum, 2.0 cm.; minimum, 1.6 cm.; average, 1.7 cm.; thickness—maximum, 0.9 cm.; minimum, 0.7 cm.; average, 0.8 cm.

*Form:* The cross section is biconvex. Shoulders are tapered. The blade edges are usually straight, rarely excravate, and are shallowly serrated. The distal end is acute. The stem is expanded. The side edges of the stem are incurvate and usually ground, and the basal edge is straight, usually ground, and may be beveled.

*Flaking:* Shallow, broad, random flaking was used to shape the blade and stem. Short, fairly deep flakes were removed from the blade edges to shape and finish the blade and to form fine regular serrations. These flakes were removed alternately from opposite faces, making the short serration projections rather sharp. The sides of the hafting area are usually steeply flaked to form an expanded area. The basal edge is usually thinned by the removal of broad shallow flakes but may be rather steeply flaked.

*Comments:* The type was named for Russell Cave in Jackson County, Alabama, where the eight specimens were recovered from lower Layer G. This was the deepest excavated cultural layer and produced three radiocarbon determinations as follows: level 17,  $7565 \pm 250$  B.P.; level 20,  $8095 \pm 275$  and  $8435 \pm 275$  B.P. These determinations place the type in the Early Archaic. Distribution of the type is not known.



**Figure 27.**—Point types and provisional categories from Lower Layer G: Russell Cave, a-d; Greenbrier, e; P-9, Side Notched, f and g; Big Sandy I, h and i; Pine Tree, j; P-2, Expanded Stem, k; Palmer (?), l; LeCroy, m and n; Kirk Serrated, o; P-12, Round Based, p; P-1, Stemmed, q; and P-11, Triangular, r.

TABLE 8.—Distribution of chipped stone projectile points, Russell Cave.

Code No.	Named Types, Provisional and Residual Categories	Total Collection		Layer B		Layer C		Layer D		Layer E		Layer F		Layer G		Lower Layer G	
		No.	% of Total Points	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
A-1	Adena	1	0.41	0.21		1	0.95	1	3.33	2	2.60	1	1.56			3	7.50
A-9	Benton Stemmed	4	1.66	0.88		5	2.07	1.05		1	0.95	5	4.72	2	6.66	1	1.30
A-10	Big Sandy I	1	0.41	0.21		11	4.57	2.31	4	7.15	5	4.72	1	0.95			
A-13	Washington	1	0.41	0.21		2	0.83	0.42	1	1.78	1	0.95			1	1.30	
A-16	Camp Creek	1	0.41	0.21		1	0.41	0.21	1	1.78	1	0.95			1	1.30	
A-17	Candy Creek	2	0.83	0.42		2	0.83	0.42	1	1.78	1	0.95			1	1.30	
A-18	Catahoula	1	0.41	0.21		4	1.66	0.88	2	3.58	1	0.95			1	1.30	
A-20	Copena	2	0.83	0.42		4	1.66	0.88	10	17.85	22	20.70	1	3.33	1	1.30	
A-20a	Copena Triangular	4	1.66	0.88		45	18.65	9.45	10	17.85	22	20.70	1	3.33	1	1.30	
A-21	Jacks Reef Corner Notched	6	2.49	1.26		6	2.49	1.26	3	5.35	1	0.95					
A-21a	Knight Island	2	0.83	0.42		2	0.83	0.42	5	4.20	2	1.88					
A-22	Coosa	10	4.15	2.10		10	4.15	2.10	1	0.95		2	2.60	3	4.70	4	9.10
A-25	Crawford Creek	1	0.41	0.21		3	1.25	0.63	1	0.21		1	1.30	1	1.56	1	2.27
A-29	Greenbrier Dalton	1	0.41	0.21		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-33	Elk River	3	1.25	0.63		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-34	Elora	1	0.41	0.21		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-35	Eva	1	0.41	0.21		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-36	Evans	1	0.41	0.21		6	2.49	1.26	2	1.88	1	3.33			1	2.50	
A-37	Flint Creek	1	0.41	0.21		3	1.25	0.63	2	3.58	1	0.95					
A-38	Flint River Spike	1	0.41	0.21		3	1.25	0.63	2	3.58	1	0.95					
A-39	Fort Ancient	1	0.41	0.21		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-40	Frazier	2	0.83	0.42		2	0.83	0.42	1	0.21		1	1.30	1	1.56	1	2.27
A-41	Gary	1	0.41	0.21		8	3.32	1.68	1	1.78	3	2.83	2	6.66	1	2.27	
A-43	Greenbrier	4	1.66	0.88		4	1.66	0.88	2	3.58	1	0.95			1	2.50	
A-45	Greenville	1	0.41	0.21		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-49	Hamilton	5	2.07	1.05		19	7.90	4.00	1	0.95	1	3.33	1	1.30	1	2.27	
A-50	Kays	3	1.25	0.63		3	1.25	0.63	1	0.95	1	3.33	1	1.30	1	2.27	
A-51	Kirk Corner Notched	5	2.07	1.05		5	2.07	1.05	5	8.92	2	1.88	1	1.30	1	2.27	
A-52	Kirk Serrated	3	1.25	0.63		1	0.41	0.21	1	0.95	1	3.33	4	6.25	12	27.30	
A-53	LeCroy	1	0.41	0.21		3	1.25	0.63	1	0.95	1	3.33	1	1.30	1	2.27	
A-59	Guntersville	3	1.25	0.63		5	2.07	1.05	3	5.35	6	5.65	1	1.30	1	2.27	
A-60	Madison	9	3.73	1.87		9	3.73	1.87	3	5.35	6	5.65	1	1.30	1	1.56	
A-60a	Jacks Reef Pentagonal	4	1.66	0.88		2	0.83	0.42	4	1.66	0.88	0.88	1	1.30	1	1.56	
A-61	Morrow Mountain	2	0.83	0.42		3	1.25	0.63	2	1.88	1	1.30	1	1.56	1	2.27	
A-61a	Morrow Mountain Straight Base	3	1.25	0.63		1	0.41	0.21	5	8.92	2	1.88	1	1.30	1	1.56	
A-61b	Morrow Mountain Rounded Base	1	0.41	0.21		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-62	Mud Creek	2	0.83	0.42		1	0.41	0.21	2	3.58	2	3.58	1	1.30	1	1.56	
A-65	Osceola	2	0.83	0.42		4	1.66	0.88	2	2.60	3	3.90	1	2.27	1	2.50	
A-69	Pickwick	1	0.41	0.21		1	0.41	0.21	5	4.72	1	3.33	1	1.30	1	1.56	
A-70	Pine Tree	6	2.49	1.26		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-70a	Pine Tree Corner Notched	1	0.41	0.21		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-72	Plevna	2	0.83	0.42		1	0.41	0.21	2	3.58	2	3.58	1	1.30	1	1.56	
A-74	Randolph	1	0.41	0.21		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-76	Palmer (?)	2	0.83	0.42		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-79	Stanly	2	0.83	0.42		9	3.73	1.87	3	5.35	4	3.77	1	3.33	2	4.54	
A-81	Swan Lake	6	2.49	1.26		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-83	Damron	1	0.41	0.21		11	4.57	2.31	1	1.78	7	6.60	1	1.30	1	1.56	
A-88	White Springs	2	0.83	0.42		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-105	Limestone	2	0.83	0.42		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-106	McIntire	1	0.41	0.21		9	3.73	1.87	3	5.35	4	3.77	1	3.33	2	4.54	
A-107	Ebenezer	2	0.83	0.42		2	0.83	0.42	1	0.21		1	1.30	1	1.56	1	2.27
A-108	Hamilton Stemmed	2	0.83	0.42		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-109	Motley	2	0.83	0.42		11	4.57	2.31	1	1.78	7	6.60	1	1.30	1	1.56	
A-114	Mountain Fork	1	0.41	0.21		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27
A-115	Purcell Cove	8	3.21	1.68		1	0.41	0.21	1	0.21		1	1.30	1	1.56	1	2.27

A-90	P1, Stemmed	117	24.65	3	5.35	17	16.00	9	30.00	35	45.30	29	45.30	11	25.00	5	12.50
A-91	P2, Expanded Stem	61	12.65	5	8.92	6	5.65	2	6.66	19	24.85	10	15.65	2	4.54	4	10.00
A-95	P6, Corner Notched	7	1.47									2	3.11	3	6.82	1	2.50
A-96	P9, Side Notched	17	3.54			2	1.88	2	6.66	2	2.60	3	4.70	2	4.54	2	5.00
A-98	P11, Triangular	12	2.51	7	12.50	5	4.72	1	3.33	3	3.90	1	1.56			2	5.00
A-99	P12, Rounded Base	3	0.63			2	3.58	3	2.83	3	10.00					2	5.00
A-101	Midsection	10	2.10			2	1.88	2	1.88			1	1.56			1	2.50
A-102	Distal End	6	1.26												2	5.00	
<b>Totals</b>		<b>475</b>		<b>56</b>	<b>106</b>		<b>30</b>		<b>77</b>		<b>64</b>		<b>44</b>		<b>40</b>		

We are well aware that the system of classification we have followed may be objected to as overly rigid and tending to ignore ranges of variation and the possible relationships of types. On the other hand, it can be argued that it is easier ultimately to combine described types than it is to split them. Doubtless, if we had laid out all the points in stratigraphic order and had classified them objectively, we would have combined some types and would also have placed into types some specimens presently in provisional categories.

A good example of the application of several type identifications to a group of points which are obviously closely related is provided by a cache of 27 Archaic points from a site on the Tennessee River in Alabama (Smith and Smith, 1960). These points, possibly produced by one person, possess an overall similarity and could be classified as a single type with some variation within it. Yet under the system used here, they fall into three named types and two provisional categories; 3 Mulberry Creek, 3 Ledbetter, 5 Pickwick, 7 P-1 Stemmed, and 9 P-2 Expanded Stem. As DeJarnette says in a comment added to the article, "In other words, we recognize five classifications, and had they been found on several sites, they could have been assigned to different cultural groups. This note is merely to re-emphasize the limitations of a too rigid taxonomic system."

The recognition of the inherent limitations of the classification used should go a long way toward viewing it as a tool to be used with discretion. But the situation also causes us to question, ever so diffidently, the statement by Willey and Phillips (1958, p. 13), "There is, happily, a general working agreement among American archaeologists about what constitutes an artifact type. . . ."

Because of a continuing interest among many workers in the eastern United States in trends in the basal shapes of projectile points, we classified

our Archaic points according to this attribute (table 9). The findings will be discussed in the final sections of this volume.

Most of the points are made of a dark chert, nodules of which are found in the local limestones. Small chips of this material were found throughout the excavated layers, indicating a considerable amount of manufacture within the cave. Some points were made of other, lighter cherts, but we had no opportunity to discover their sources. Only a few points were fashioned from quartzite.

A general feature worthy of notice is the number of broken projectile points in our collection—196 specimens, or 47 percent of the total. These points show missing tips, impact fractures, and other sorts of damage. Only twelve of this number are distal ends or midsections, and even this figure may be somewhat excessive because of the difficulty in distinguishing the distal ends of projectile points from those of blades. The vast majority of the damaged points range from bases alone to nearly complete specimens with broken tips. The implication is that these points were not damaged in the cave but were brought back on their shafts, which could then be re-used. The comparison of total points and broken points by stratigraphic units is shown in table 10.

### Projectile Points: Stratigraphy

As in the case of ceramics, disturbance in the site required the selection of certain units for stratigraphic analysis. Squares and layers in which disturbance had occurred to an appreciable degree were omitted. For Layer D and above, the squares were the same as those used for the ceramic analysis. Below Layer D, in the Archaic layers, intrusions from above could be clearly seen and ruled out. Because the situation seemed somewhat clearer in the Archaic layers, we were able to assign 417 of our 475 points to a specific layer with some degree

TABLE 9.—Distribution of basal shapes of Archaic points, Russell Cave.

Basal Shape	Layer E		Layer F		Upper Layer G		Lower Layer G		Totals	
	No.	%	No.	%	No.	%	No.	%	No.	%
Stemmed	46	59.75	40	63.50	29	66.00	9	25.80	124	56.70
Expanded Stem	19	24.65	10	15.85	2	4.54	11	31.40	42	19.30
Contracting Stem	2	2.60	2	3.17	2	4.54			6	2.73
Side Notched	3	3.90	4	6.35	3	6.72	7	20.00	17	7.78
Corner Notched	1	1.30	2	3.17	3	6.72	3	8.57	9	4.11
Base Notched					3	6.72	3	8.57	6	2.73
Stemless	6	7.80	5	7.95	2	4.54	2	5.72	15	6.85
Totals	77	100.00	63	99.99	44	99.78	35	100.06	219	100.20

TABLE 10.—Comparison of total points and broken points by stratified units, Russell Cave.

Layer	Total Points	Broken Points	Percentage Broken
B	56	22	39.30
C	106	48	45.25
D	30	17	56.75
E	77	42	54.50
F	64	29	45.25
Upper G	44	24	54.50
Lower G	40	24	60.00
Totals	417	206	47.00

of assurance. When our analysis was completed (table 8), we surmised that we had not succeeded in ruling out all mixture, but the general picture seemed quite satisfactory.

Layer A was omitted from the analysis because it was a highly mixed surface deposit containing relatively few points. Layer G was split into upper and lower portions for purposes of analysis, and this proved to have considerable significance.

After devoting a good deal of effort to the placement of the points, we decided against presenting the data in any more finely divided form than our layers since it appeared that we would only be creating confusion. In Layers F and G, the flooding action had effectively obliterated any evidences of natural stratigraphic units, and the arbitrary 6-inch levels were not strictly equivalent from square to square, particularly in the lower portions where the unevenness of the sloping surface of the rockfall further complicated matters.

We view each layer as a block of time rather than as a cultural unit. For example, when we speak of Layer F as Middle Archaic, we are referring to it as a block of time from about 5000 to 3500 B.C. We are not regarding it as a complex or a phase, or even as a component. Not only did the physical nature of the deposits lead us to this position; we were also influenced by the fact that each layer contained a variety of point types. Armed with the developing picture of short-term occupations characterized by a single point type or by a limited number of point types (Coe, 1964; Broyles, 1966) we were led to regard the cultural content of any layer, and more particularly of the Archaic layers, as the result of the mixture of occupations within the time span covered by that layer.

### Lower Layer G

The earliest material from our excavation includes 40 points from the lower portion of Layer G (table

8, fig. 27). Specimens represent nine named types, six provisional categories, and two residual categories. This layer has a higher percentage of expanded stemmed and side-notched points than any other (table 9).

There are no truly Paleo-Indian points here; no fluted points and no Daltons. The single Greenbrier Dalton (fig. 29a) was ascribed to Layer F, where it is clearly out of place. There is a possibility, however, that Layer G was not recognized in this square and that the point was in a truly basal position in the site.

Only three named types occur in any quantity. They are Big Sandy I (fig. 27h and i), Russell Cave (fig. 27a-d), and LeCroy (fig. 27m and n). All of these types are confined to this portion of Layer G.

Big Sandy I, a side-notched point with ground basal edge, may well be our earliest type. Points of this type were found with Dalton points in the lowest zone of the Stanfield-Worley shelter (DeJarnette, Kurjack, and Cambron, 1962).

The Russell Cave point, defined herein, was the most numerous type in the lower portion of Layer G. The distribution of this type is presently unknown, but a specimen quite similar in appearance is illustrated from the lower portion of Bat Cave, New Mexico (Dick, 1965, fig. 23g). Herbert Dick illustrates it as one of the variants of his Bat Cave point.

The LeCroy points are clearly confined to Lower G at Russell Cave. The general picture in regard to bifurcated base points will be discussed in Part 7, the section on Southeastern archeology. Here we will only note that our LeCroys tend toward the large end of the range of the type, as it was defined elsewhere.

The only other named type which occurs as more than a single specimen in Lower Layer G is Kirk Serrated (fig. 27o). The primary locus for this type is clearly in Upper Layer G. The points here may represent either the first use of the type at Russell Cave or displacement downward from Upper G.

The one possible Palmer point (fig. 27l) would not be out of place at this early time level.

Nearly half of the projectile points from Lower Layer G are illustrated in Fig. 27. Despite the range suggested by the classification, we are struck by the similarity of many of the points. This "sense" of similarity extends also to the points of Upper Layer G. The presence of serrations on many of the specimens doubtless helps to create this impression.

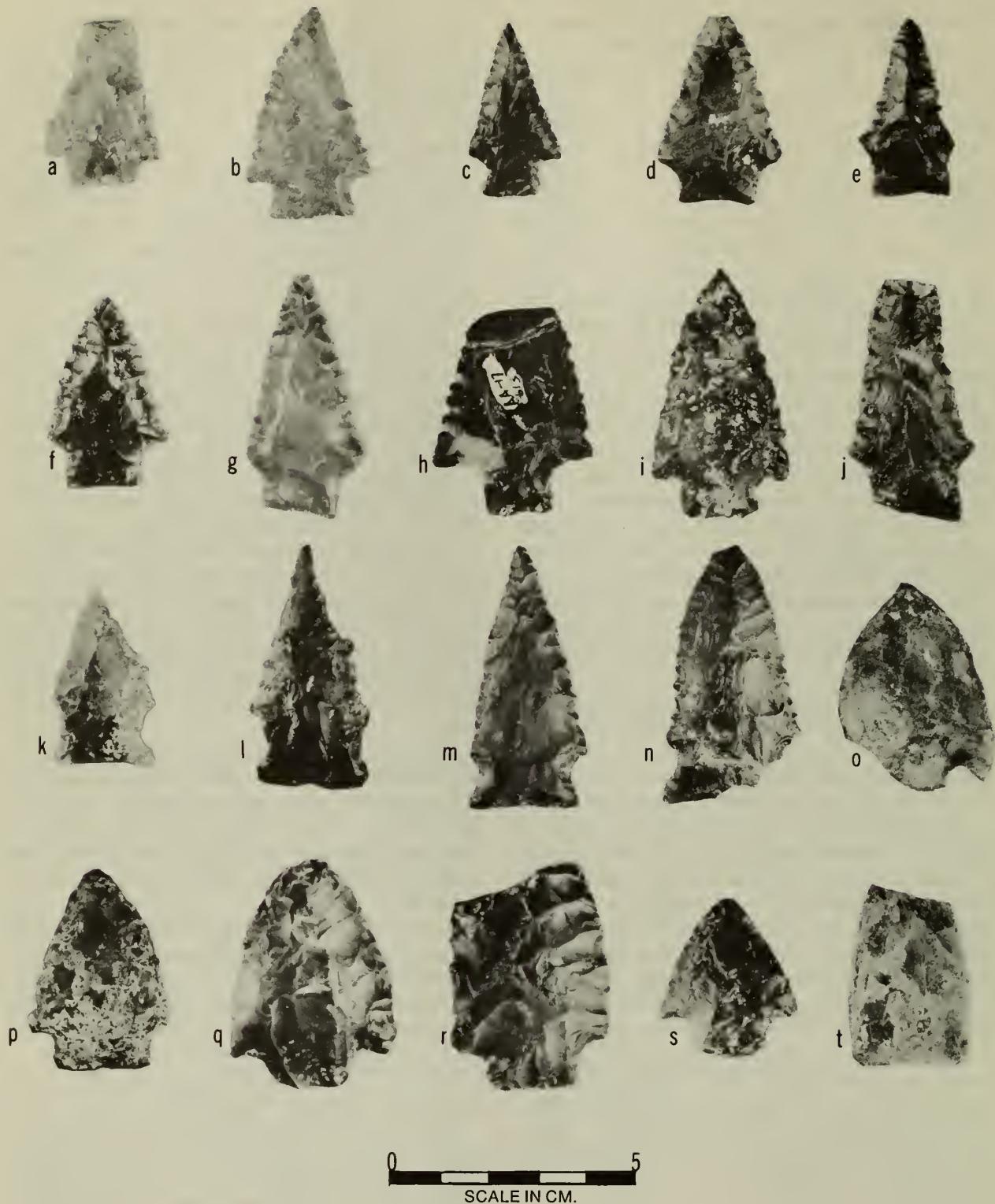
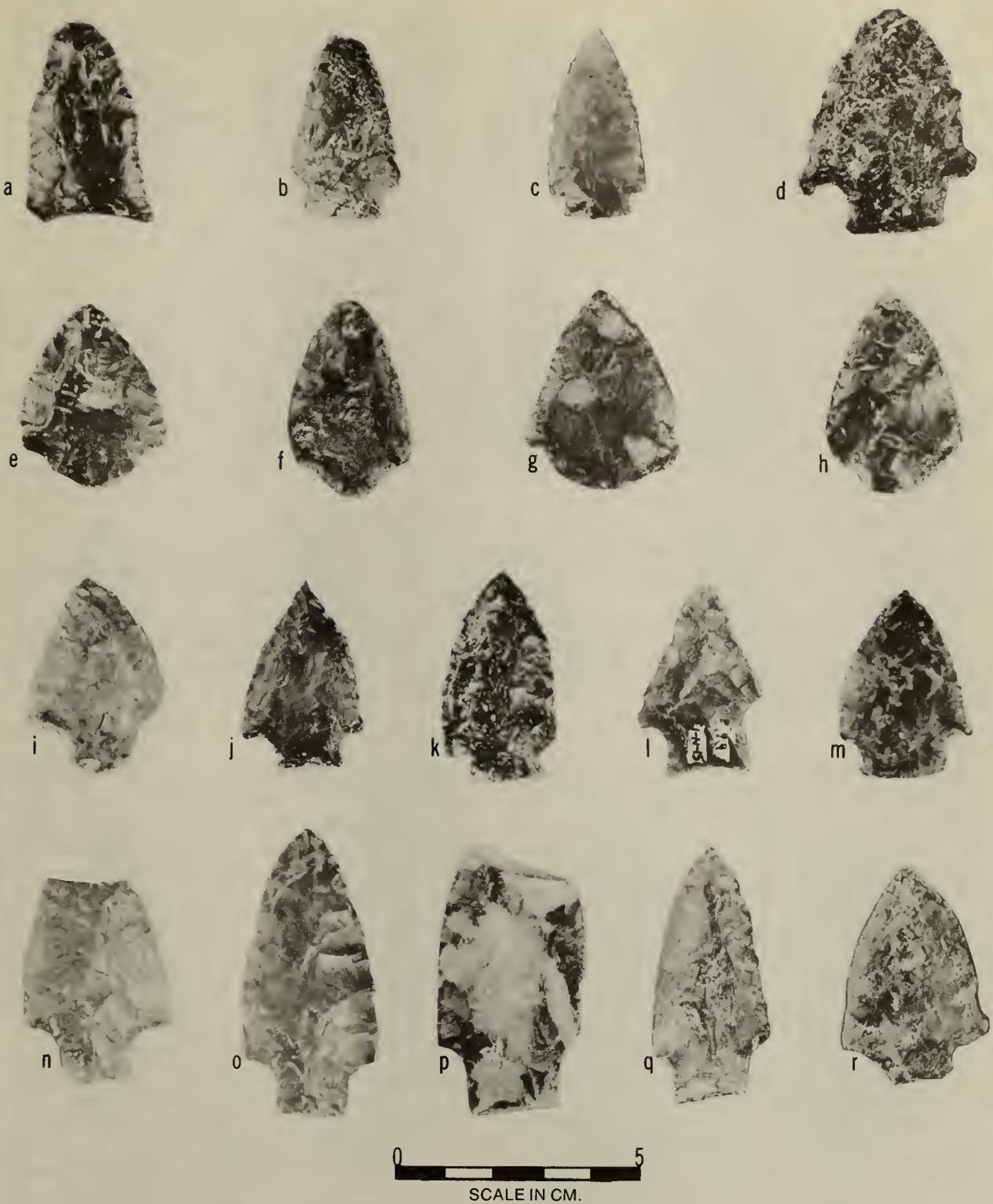


Figure 28.—Point types and provisional categories from Upper Layer G; Stanly, a; Crawford Creek, b and c; P-1, Stemmed, d and e; Kirk Serrated, f-j; P-9, Side Notched, k and l; P-2, Expanded Stem, m; Pine Tree, n; Eva, O; White Spring, p; P-1, Stemmed, q; Elk River, r; Morrow Mountain Straight Base, s; and Frazier, t.



**Figure 29.**—Point types and provisional categories from Layer F: Greenbrier Dalton, a; Crawford Creek, b and c; Kirk Serrated, d; Morrow Mountain, e and f; Morrow Mountain Rounded Base, g and h; P-1, Stemmed, i and j; Sublet Ferry, k; Limestone, l; P-2, Expanded Stem, m; Elk River, n; Kays, o; and P-1, Stemmed, p-r.

### *Upper Layer G*

The upper portion of Layer G (fig. 28) contains 44 points of 11 named types and four provisional categories (table 8). The tabulation of basal shapes (table 9) shows a marked increase in stemmed forms at the expense of the expanded-stem and side-notched forms in Lower G.

Kirk Serrated points (fig. 28f-j) account for over 27 percent of the total points in this portion of Layer G. This is clearly the locus of this type at the site. Crawford Creek (fig. 28b and c), a type which bears some resemblance to Kirk Serrated, reaches its maximum number and percentage in Upper G, although it also occurs later.

Our only two Stanly points, an early type in Coe's sequence, are found in this portion of Layer G (fig. 28a). It should be noted that we are retaining the spelling of Coe (1964) for this type, rather than "Stanley," as given by Cambron and Hulse (1964).

All other named types in Upper G are represented by only one specimen each, but some of them, such as the Eva (fig. 28o), seem to be in the proper place when comparative material is taken into account.

Nearly half of the points from Upper Layer G are illustrated in figure 28, and again we are struck by the general similarity of most of the points within this portion of Layer G.

### *Layer F*

The line between Layers F (fig. 29) and G, if such exists, was difficult to see in the field. Dr. Hack has described them together; we divided them in a somewhat arbitrary fashion. Yet the projectile point types separate rather well. Sixty-four points came from this layer, representing 11 named types, five provisional categories, and one residual category (table 8). Stemmed points continue to dominate the picture, following the trend in Upper Layer G (table 9).

Kirk Serrated is the most numerous type, but its percentage is noticeably reduced from that in Upper Layer G. Its presence may partially reflect the difficulty in dividing Layers F and G.

The three Morrow Mountain types identified by Cambron, when taken together, slightly outnumber the Kirk Serrated points. This layer seems to be the true locus of Morrow Mountain points in Russell Cave, although there are a few specimens both above and below Layer F. Examples are shown in figure 29e-h.

Of special interest is the dramatic increase of the provisional category, P-1 Stemmed, into which unclassified stemmed points are placed. The percentage of these in Layer F is exactly that in Layer E.

Our single Greenbrier Dalton (fig. 29a) came from this layer. It came from the lower portion of Layer F in Square D, where no Layer G was recognized (fig. 6). This was in a portion of the site in which the rockfall was relatively higher than in some other squares. It is possible that the point actually came from an earlier time period, near the top of the rockfall. It is also possible that the point was displaced by aboriginal activity. All that can be said with certainty is that a Dalton point does not belong in Layer F, considering the overall stratigraphy.

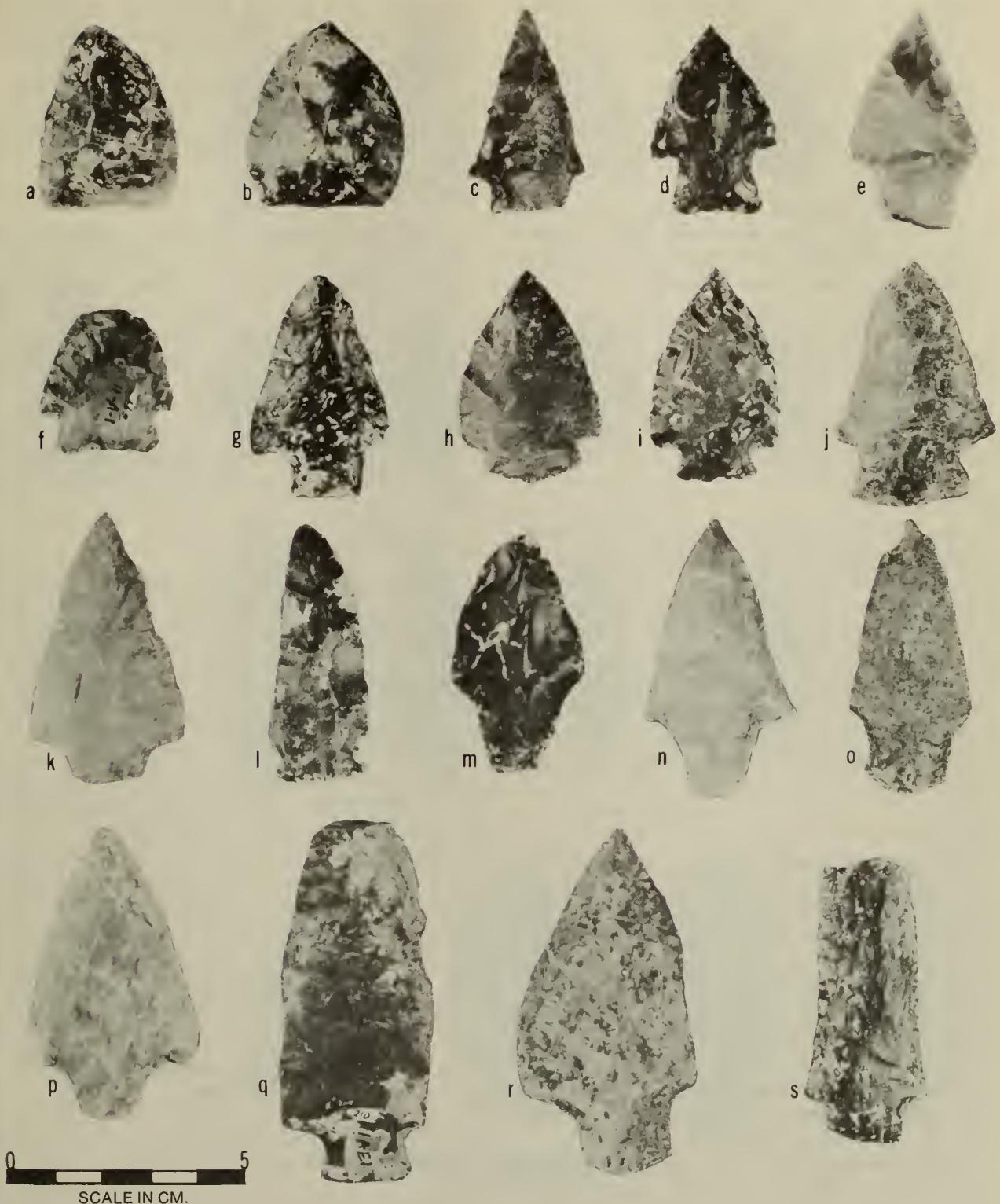
In our view, the general appearance of points from Layer F contrasts rather sharply with the points from Layer G. However, except for the Morrow Mountain types, there is little that is really distinctive about Layer F. Some points resemble those from Layer G, others those from Layer E. The upper limits of Layer F were more or less defined by the height to which floodwaters affected the deposits. We would assign a duration of from 1,000 to 1,500 years to Layer F on the basis of our series of radiocarbon determinations, and for want of a better term we would designate this time span as Middle Archaic.

### *Layer E*

Layer E (fig. 30) was clearly distinguishable from underlying Layer F and overlying Layer D, but as we have suggested earlier the lower limit is defined by the height to which past floodwaters rose in the cave, and it would be stretching coincidence to the extreme to assume that a sharp cultural break was attested to by this purely localized geological feature. It was, however, an easy unit to see and a convenient one for analysis. We call it Late Archaic, but without assuming that the Late Archaic began with the lower edge of Layer E.

This layer was rarely over 1 foot in thickness, yet it seems to cover a period of about 3,000 years (3500 to 500 B.C.). Independently of the radiocarbon evidence, Hack reached the conclusion that the process of accumulation involved in this layer must have been very slow.

Seventy-seven points came from Layer E, representing 13 named types and four provisional categories (table 8). Over three-quarters of the points are in the provisional categories; P-1 Stemmed ac-



**Figure 30.**—Point types and provisional categories from Layer E: Paint Rock Valley, a; P-11, Triangular, b; Crawford Creek, c; McIntire, d; Benton Broad Stemmed, e; P-1, Stemmed, f and g; P-2, Expanded Stem, h-j; P-1, Stemmed, k; P-2, Expanded Stem, l; Gary, m; Pickwick, n; Elk River, o; Elora, p; P-2 Expanded Stem, q; Ledbetter, r; and P-1, Stemmed, s.

counts for 45 percent of the total number of points. Table 9 shows that about 85 percent of the points are either stemmed or expanded stemmed.

Only one named type, Pickwick (fig. 30n), is represented by as many as three specimens. This is a Late Archaic type perfectly at home here. Many of the other named types are also known to be Late Archaic types.

Our only specimens of the Paint Rock Valley point (fig. 30a) came from this layer, although Cambron and Hulse (1964) regard this type as dating from transitional Paleo-Indian to Early Archaic times.

All in all, the points from Layer E represent a good sampling of Late Archaic in this region. They obviously relate to the well-known "shell-mound" Archaic of the Tennessee River. On the average, they are larger than the points from periods either before or after this time.

### *Layer D*

This layer, the Early Woodland as defined by the ceramics, contained only 30 points, represented by 11 named types, four provisional categories and one residual category (table 8). Since most of the types are found also either above or below this layer, we have not illustrated any specimens from Layer D.

It is difficult to arrive at a sound conclusion concerning the point types associated with the ceramics in this layer, but the occurrence here of Camp Creek, Greenville, Adena, and Copena points is not unexpected.

### *Layer C*

This layer contained 106 points, representing 23 named types, four provisional categories and two residual categories (table 8). Jacks Reef Corner Notched (fig. 31g-j) enters forcefully into the picture, accounting for over 20 percent of the points. Jacks Reef Pentagonal (fig. 31d and e) makes its appearance. Camp Creek (fig. 31a) and Greenville (fig. 31c), found below in Layer D, apparently continue on into this time period. Two small stemmed types, Mountain Fork (fig. 31p) and Ebenezer (fig. 31q) appear in respectable numbers. Swan Lake (fig. 31o) is virtually confined to this layer.

Mention should be made of the three Kirk points which occur in this layer and Layer D. All of these specimens were badly battered and heavily encrusted, contrasting rather sharply with most of the other points from these layers. They gave every

appearance of being just what they most likely are, upward displacements from aboriginal pitting spread onto a later surface.

The points from Layers B and C are vastly different from those of any of the Archaic layers at the site. They represent types popular in Woodland times.

### *Layer B*

This layer contained 56 points, representing 13 named types, three provisional categories, and one residual category (table 8). Jacks Reef Corner Notched continues to be the most numerous named type, with nearly as high a percentage as in Layer C. The Mountain Fork type disappears and Randolph (fig. 31n) appears. The distribution of the other types is shown in table 8.

Making their appearance in this layer, and presumably related to the small Mississippian representation in the ceramics, are Madison and Fort Ancient points.

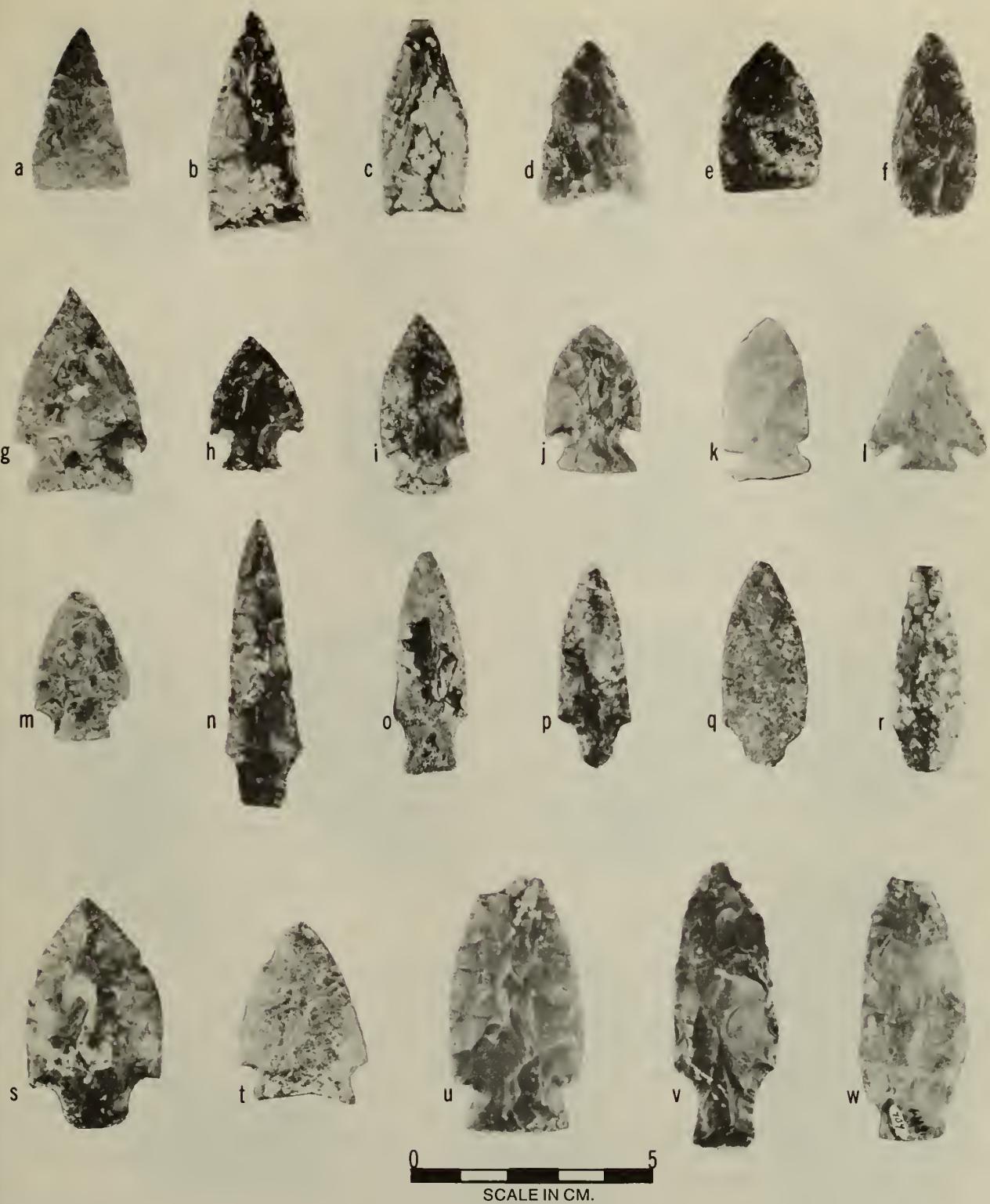
### *Projectile Points in Pits*

Burial 4 had been partially destroyed by a pit designated W 13 Pit. Contents of the pit were meager and included no pottery. Three projectile points were found; one Morrow Mountain, one contracting stemmed point somewhat resembling Morrow Mountain but with a more pronounced stem and a longer blade, and one large straight stemmed specimen. This seems to be a Layer F pit which penetrated a somewhat earlier Layer F burial. The problem of the reversed radiocarbon determinations from here has been discussed in the Introduction.

The large Woodland pit, called P 12 Pit, contained a number of projectile points. It will be recalled that the pottery analysis presented in table 7 disclosed a Layer C ceramic complex. Table 11 gives the classification of the projectile points, and it is immediately obvious that a Layer C complex, with a dominance of Jacks Reef Corner Notched,

TABLE 11.—*Projectile points from P12 Pit, Russell Cave.*

Types, and Provisional and Residual Categories	Count	Percentage
Jacks Reef Corner Notched	7	50.00
Mountain Fork	2	14.28
McIntire	1	7.14
Stemmed	1	7.14
Expanded Stem	1	7.14
Midsection	2	14.28
<b>Totals</b>	<b>14</b>	<b>99.98</b>



**Figure 31.**—Point types and provisional categories from Layers C and B: Camp Creek, a; Copena Triangular, b; Greenville, c; Jacks Reef Pentagonal, d and e; Guntersville, f; Jacks Reef Corner Notched, g-j; Knight Island, k; Catahoula, l; Coosa, m; Randolph, n; Swan Lake, o; Mountain Fork, p; Ebenezer, q; Flint River Spike, r; P-1, Stemmed, s; Benton Broad Stemmed, t; Hamilton Stemmed, u; P-1, Stemmed, v; and Flint Creek, w.

is present here, in complete accord with the pottery. Since this pit penetrated all preceding layers down to the top of Layer G, it is to be seen that failure to isolate pits may seriously affect the temporal span of point types based on stratigraphy at a site like Russell Cave.

## Uniface Tools

Ninety chipped stone artifacts of the local dark chert were classified as uniface tools. These were placed in the seven groups described below, and their distribution in the site is shown in table 12. It will be noted that the uniface tools were heavily concentrated in the Archaic layers, with 60 percent of them coming from Layer G.

**Core scrapers.** Eighteen scrapers of this kind were found and three are illustrated in figure 32j-l. The bottom side of these tools exhibits a single smooth flake surface. They are quite thick and were fashioned from cores with subsequent trimming of one or more working edges. They are largely concentrated in Lower Layer G and may be regarded as Early Archaic.

**Oblong, thick end scrapers.** These are relatively large tools (2 to 3½ inches long) with a working edge at one end. Two are illustrated in figure 32n and o. They occur almost equally in all of the Archaic layers.

**Flat, ovoid end scrapers.** Fourteen tools were so classified (fig. 32a and b). They are thinner and better made than the core scrapers. The working edge is confined to one portion of the outline. These scrapers were found mainly in the Early Archaic Layer G, but a few specimens occurred throughout most of the time range.

**Broad-end, trapezoidal scrapers.** These fourteen scrapers, produced on a flake, have a roughly triangular outline with a broad working end (fig. 32c and d). In general, they are not as thick as the following group, and hence do not display the steep end to such a degree. They were concentrated in the Early and Middle Archaic, with the highest percentage in the former.

**Small, narrow, trapezoidal scrapers.** These are typical steep-nosed Early Archaic tools (fig. 32e and f), with six of the 10 specimens found in Layer G and the rest in higher levels.

**Pointed uniface blades.** These are uniface blades or knives, asymmetrical in outline (fig. 32g and h). The chipping indicates the sides as the working

TABLE 12.—Distribution of other chipped stone artifacts, Russell Cave.

Category	Layer	Layer	Layer	Layer	Layer	Layer	Totals
	B	C	D	E	F	G	
Uniface Tools							
Core scrapers				1	1	16	18
Oblong, thick end scrapers			1	3	3	4	11
Flat, ovoid end scrapers	1		1	2		10	14
Broad-end, trapezoidal scrapers				1	4	9	14
Small, narrow trapezoidal scrapers	1		1	1	1	6	10
Pointed uniface blades		2	3	3	1	4	13
Utilized flakes	1		2	1	1	5	10
<b>Totals</b>	<b>3</b>	<b>2</b>	<b>8</b>	<b>12</b>	<b>11</b>	<b>54</b>	<b>90</b>
Biface Tools							
Triangular blades	3	7	4	1	13	10	38
Ovoid blades	2	4		5	6	2	19
Triangular, round-based blades	1		1	1			3
Leaf-shaped blades	1	3		2		2	8
Thick, pointed blades	2	3	2	1	4	1	13
Rounded, oblong blades		1			2		3
Asymmetrical blades	1	1	1	2	5	2	12
Skewed-base blades				1	2	2	5
Stemmed end scrapers		1	1				2
Drills	2	10	6	4	4	1	27
<b>Totals</b>	<b>12</b>	<b>30</b>	<b>15</b>	<b>17</b>	<b>36</b>	<b>20</b>	<b>130</b>

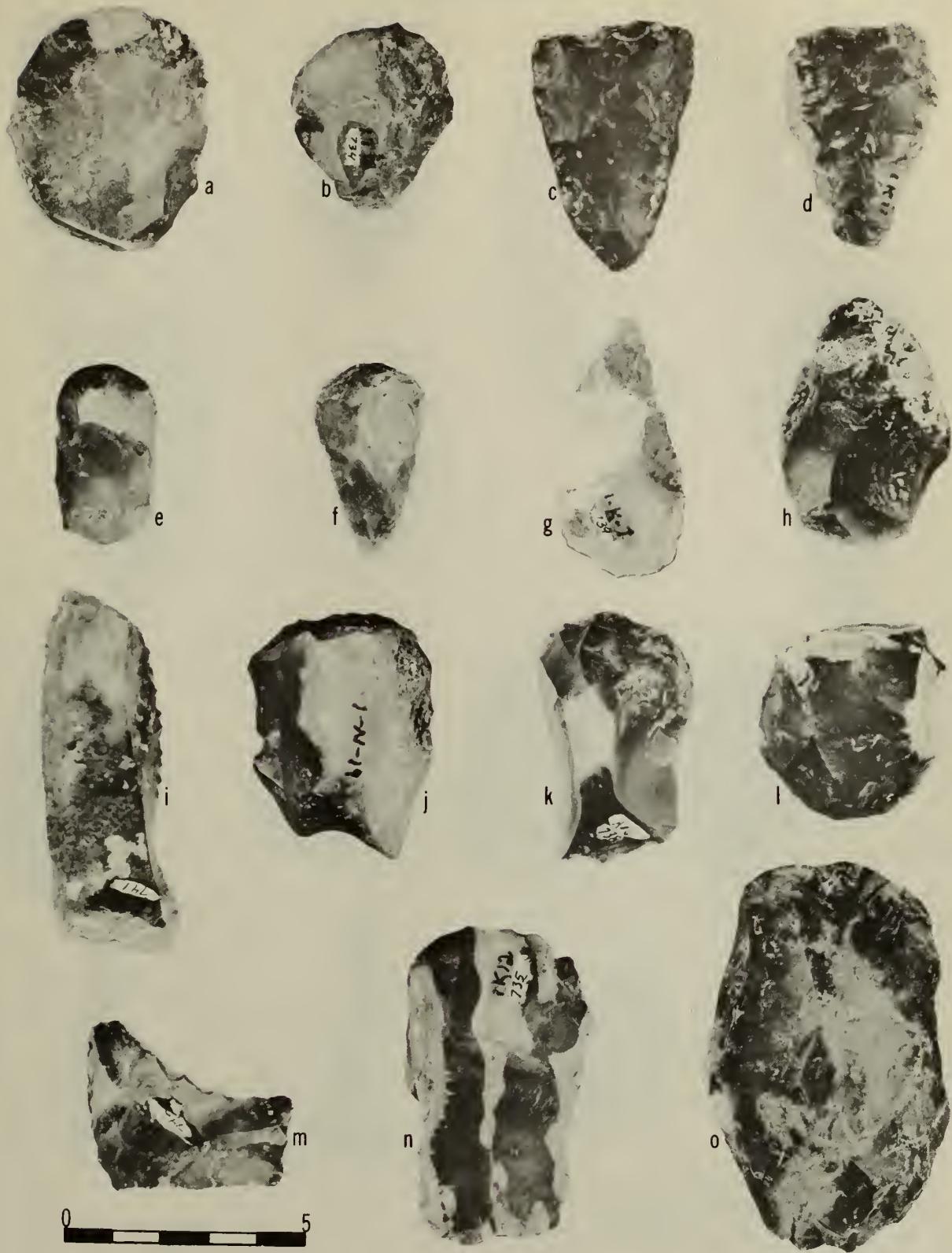
edges. The 13 specimens were distributed throughout the layers.

**Utilized flakes.** Only the most obvious examples of flakes showing signs of utilization were picked out of the mass of chipped material (fig. 32i-m). Undoubtedly many more exist in the material presently in storage, and the numbers and distribution given here should not be taken too literally. One would expect them to be prevalent in the Early Archaic.

## Biface Tools

Bifacially chipped stone tools, other than projectile points, were represented by 130 specimens which were separated into 10 groups. Their distribution in the site is given in table 12. As might be expected, this class of tools is more widely spread through the layers than the uniface tools, although Layer F contains the largest number. Several groups show concentrations that will be discussed under the individual groups.

**Triangular blades.** There are 38 specimens in this group (fig. 33a and b), most of them coming from Layers F and G. The range in size is from 1½ to 3 inches in length, with the majority falling between



**Figure 32.**—Uniface Tools: flat, ovoid end scrapers, a and b; broad-end, trapezoidal scrapers, c and d; small, narrow, trapezoidal scrapers, e and f; pointed uniface blades, g and h; utilized flakes, i and m; core scrapers, j-l; oblong, thick, end scrapers, n and o.

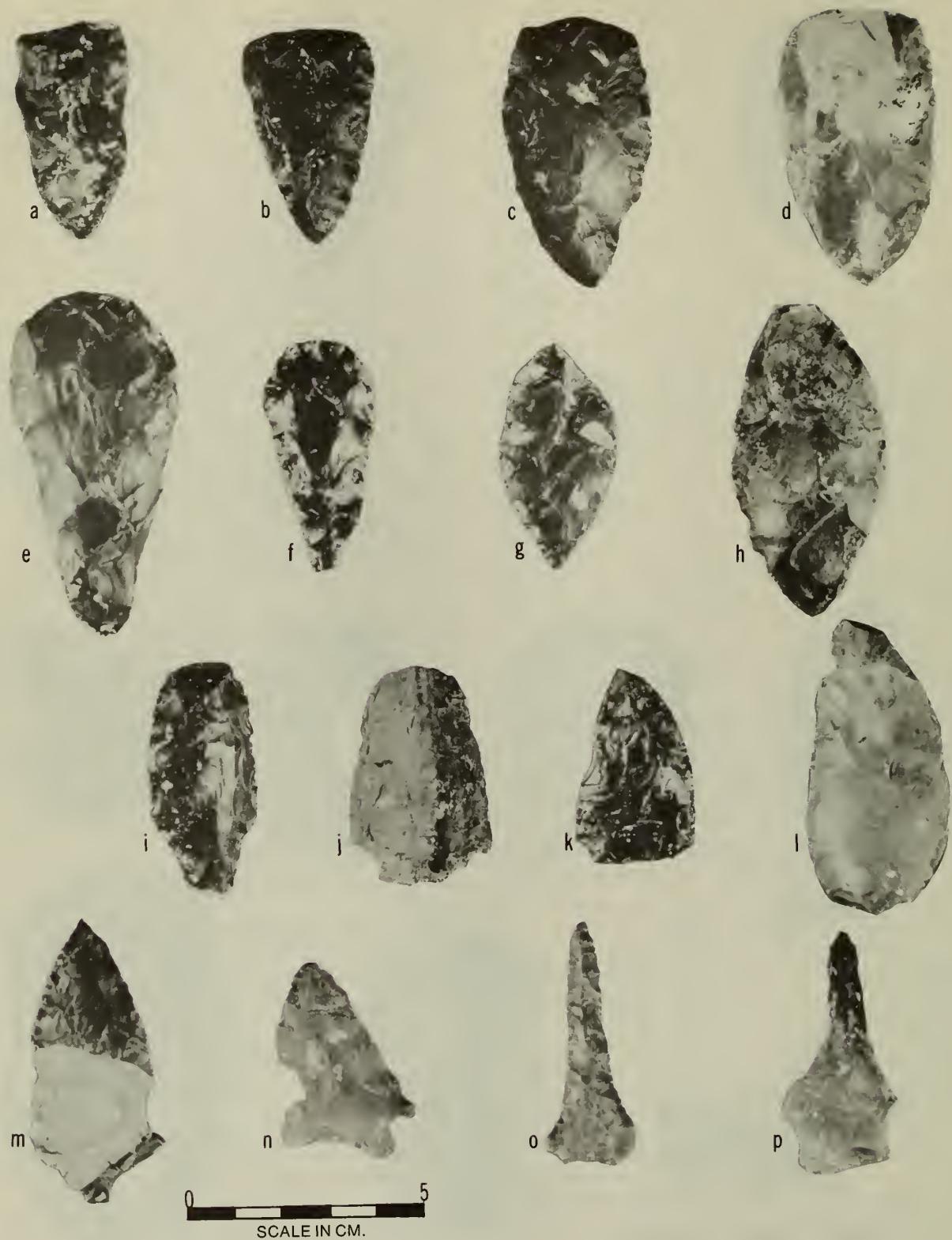


Figure 33.—Biface Tools: triangular blades, a and b; ovoid blades, c and d; triangular, rounded-base blades, e and f; leaf-shaped blades, g and h; stemmed end scrapers, i and j; asymmetrical blades, k and l; skewed-base blades, m and n; and drills, o and p.



Figure 34.—Large biface tools: thick, pointed blades, a and b; and rounded, oblong blades, c and d.

1½ and 2½ inches. Because of the orientation of mounting in the illustration, these and other biface blades may appear to be end scrapers, but they are not. Some of them may have been hafted at the broad end.

**Ovoid blades.** Nineteen specimens were found (fig. 33c and d), with over half of them in Layers E and F. They differ from the triangular blades primarily in the outline of the edges, but they also tend to be wider in proportion to length and somewhat thinner.

**Triangular, rounded-based blades.** Only three of these were found, two of which are illustrated (fig. 33e and f). They differ from the previous two groups in having a rounded base.

**Leaf-shaped blades.** Eight specimens, scattered through the layers, exhibited leaf-shaped outlines which distinguished them from the other biface blades from this site (fig. 33g and h).

**Thick, pointed blades.** The 13 specimens in this group are relatively thick and crude (fig. 34a and b). Some could be considered as unfinished blanks, but all could have served a functional purpose as they are.

**Rounded, oblong blades.** There were only three of these relatively large, well-finished tools (fig. 34c and d).

**Asymmetrical blades.** Twelve examples were found (fig. 33k and l). They were concentrated in the Archaic layers. In outline, these blades slightly resemble some of the pointed uniface blades. One of the illustrated specimens (fig. 33l) clearly shows manufacture on a flake, with, however, bifacial working at the tip end. Most of them are as well made as the projectile points from the site.

**Skewed-based blades.** All five blades of this group were from the Archaic layers, with most of them from Layers F and G (fig. 33m and n).

**Stemmed end scrapers.** Two specimens, both illustrated in figure 33i and j, came from Woodland levels of the site. Presumably they were reworked projectile points.

**Drills.** Of 27 drills (fig. 33o and p), only one was stemmed (fig. 33p). It came from Layer E. The other drills either lacked bases or had expanded bases of various sizes. Most of the specimens were from Woodland layers, with the greatest number from Layer C.

## Ground and Rough Stone Objects

The ground and rough stone artifacts from our excavation are described below and their distribution in the site is given in table 13. As in the pre-

TABLE 13.—Distribution of ground and rough stone artifacts, Russell Cave.

Category	Layer B	Layer C	Layer D	Layer E	Layer F	Layer G	Totals
Bell-shaped mullers				2		2	
Conoidal pestles	1			1	1	1	3
Conoidal hammers			1	1	1	1	3
Loaf-shaped mullers	2	1					3
Anvil stones	1	1		3	7	12	
Shallow mortars				2	2	2	4
Flat mortars	2						2
Nutstones				3			3
Hammerstones	1	1		1	4	5	12
Digging tools	5		1	1	1	2	10
Awl sharpeners	1			1		1	3
Boatstone				1			1
Gorges		2					2
Plummets	1						1
Polished hematite	2	2	1	3	1	7	16
Spindle whorl	1						1
Stone pipe	1						1
Stone bead				1			1
Pitted pebble	1						1
Polished limestone				1			1
Totals	4	19	6	17	10	26	82

ceding sections, discussion is mainly limited to those artifacts that can be related to our layers.

**Bell-shaped mullers.** Two specimens were found in Layer F; one of them is illustrated in figure 35a. Both were made of limestone, and they were pecked and polished to an overall smooth finish. Pestles of this type are listed as a trait of Archaic 2 in the Pickwick Basin (Webb and DeJarnette, 1948a, p. 19).

**Conoidal pestles.** The term, "conoidal pestles," is used to denote the use of three conoidal stream pebbles of quartzite, one of which is illustrated in figure 35b. On all of them the blunt end has been pitted, suggesting that they had been used for rough work. Some attempt was made to shape the upper end by pecking, but most of the surfaces, smoothed by stream action, were left untouched. Two specimens came from Archaic layers, and a third was from Layer C.

**Conoidal hammers.** Three conoidal stones from Archaic layers show battered corners and edges, presumably from use as hammers.

**Loaf-shaped mullers.** The three excavated specimens of this type came from Woodland layers. All are of limestone, and all have a single shallow depression in the center of the flattened grinding surface. The specimen illustrated in figure 35c clearly shows the pecking marks resulting from shaping it.

**Anvil stones.** Twelve stones of various shapes and sizes show a roundish area of pitting on one flat side. Most of them could have been used for pounding and grinding; none of them show indications of

having been deliberately shaped. Seven are of sandstone and five are of limestone. While they occurred throughout the site, most of them were found in the Archaic layers, particularly in Layer G.

**Shallow mortars.** Four sandstone slabs, two from Layer E and two from Layer G, have shallow ground depressions in each face. These were the only undoubtedly mortars from the Archaic layers but there were a number of slabs of limestone that could have been used as mortars.

**Flat mortars.** Two specimens from Woodland levels are large limestone slabs with round, shallow depressions. Apparently the grinding on them had been done by a rotary motion.

**Nutstones.** Three examples were found in the Late Archaic Layer E. They are typical of this common enigmatic class, displaying small circular depressions. One specimen has two depressions side by side, and another contains depressions on opposite sides. Both sandstone and limestone were used.

**Hammerstones.** Twelve stones battered around the edges came from the Archaic layers. They are of quartzite, sandstone, and limestone.

**Digging tools.** Ten large, crudely chipped tools of limestone were found in all layers except Layer B. An example showing more shaping than most is illustrated in figure 36. Most of the specimens are crudely elongate slabs with a few large flakes removed from the working end to sharpen the tool. Artifacts like these have in the past often been referred to as hoes, and even taken as evidence of agriculture. In the present instance, at least, we interpret them as tools used in the digging of the many pits found at the site.

**Awl sharpeners.** Two awl sharpeners are thin pieces of very fine sandstone marked by straight longitudinal grooves. The one illustrated in figure 37 came from the Woodland P12 Pit; the awls shown with it are also Woodland specimens. A third awl sharpener was a piece of what appeared to be a stream pebble of very coarse sandstone having numerous short grooves on the various surfaces of the stone. It came from Layer G.

**Boatstone.** A specimen of polished argillite (fig. 38c) resembles an incomplete boatstone. It is possibly an unfinished atlatl weight, and came from the Late Archaic Layer E.

**Gorges.** Two broken gorges came from the Early Woodland Layer D. One of these (fig. 38a) is made of a colorful fossiliferous marble, shaped in the



Figure 35.—Bell-shaped muller, a; conoidal pestle, b; and loaf-shaped muller, c.

form of a broad rectangular bar. Two perforations are present along the midline; one end of the gorget was broken through one of them. The other specimen, broken jaggedly at one end (fig. 39e), has convex sides and an oval perforation drilled near the intact, slightly convex end.

**Plummets.** A limestone plummet (fig. 38b) came

from Layer C. Another plummet (fig. 39a) was discovered while straightening the walls of the excavation and is of uncertain provenience.

**Polished hematite.** Small pieces of polished hematite were found in every layer, with the greatest number coming from Layer G. The polishing on most of them may simply be a by-product of grind-

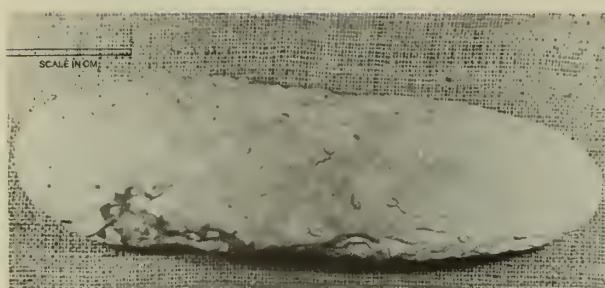


Figure 36.—Digging tool.

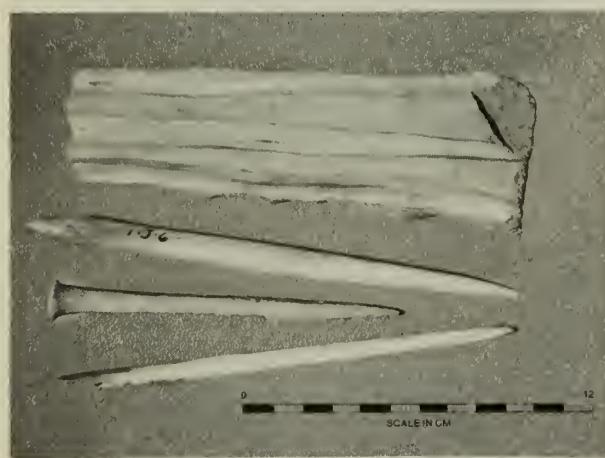


Figure 37.—Awl sharpener and bone awls.

ing the mineral for red ocher powder. However, one of them (fig. 39f) appears to have been part of a tablet or a plaque. This specimen came from Layer G.

**Spindle whorl.** A discoidal object of slate with a central perforation (fig. 38d), from the Woodland Layer C, has been tentatively designated as a spindle whorl.

**Stone pipe.** What appears to be the fragment of a pipe bowl of claystone was found in the Woodland P12 Pit. The projected diameter of the bowl is about 2.8 cm., and the bowl opening is about 1.3 cm. in diameter.

**Stone bead.** A red stone bead (fig. 39c) came from the Late Archaic Layer E. It is 1.1 cm. in diameter and 0.5 cm. thick.

**Pitted pebble.** A sandstone pebble from Layer C has a ground depression in one face (fig. 39d).

**Polished limestone.** A small slab of limestone from Layer D shows traces of cutting on one face and is polished (fig. 39b).

## Bone, Antler, and Shell Objects

The bone, antler, and shell objects from our excavations were in unusually good condition. Although the cave deposits were quite damp, the percolating water contains a considerable quantity of lime in solution, derived from the limestone of the cave surroundings and from the cave sediments. This mineral-bearing water acts as an excellent preservative for these objects. Many of the bone tools, in particular, retain a high surface polish.

The distribution of artifacts of these three materials is given in table 14.

**Split bone awls.** The most common type of bone tool was an awl made from a split bone which had one end ground to a point. In most instances a splinter of bone was used, but in some cases all or part of the condyle remains as a grip. Modification of the bone other than the pointed end was minimal. All of the awls seem to be made of deer or turkey bone, the two commonest forms noted in the faunal study. A few examples are illustrated in figure 40g-k. While split bone awls occurred in all layers, they were most popular in the Archaic layers, and of these Layer G yielded the greatest number.

**Small mammal ulna awls.** Four awls were made from the ulnas of small mammals, unmodified except for grinding one end to a point (fig. 40c and d). Two specimens came from Layer F and two from Layer G.

**Bird bone awls.** This term is used to characterize those awls made from bird bones which were not split but had one end cut obliquely and then ground to a point (fig. 40l and m). As noted above, bird bones which were split were included in the split bone awl group. The 33 unsplit awls were largely confined to the Archaic layers, with over 50 percent of them from Layer G.

**Double-tapered awls.** These awls were made from splinters of bone, probably mostly deer bone, carefully smoothed and polished overall. Both ends are pointed, but one end is much more sharply pointed than the other (fig. 41a and b). These awls occurred sparingly in most of the layers. Lewis and Kneberg (1961, p. 78) describe similar specimens and suggest that they may have been designed to pass completely through the material being perforated, or that they may have been used as projectile points. Double-pointed bone implements of a somewhat different type are figured as bone projectile points from the Morrow Mountain complex at the Stan-

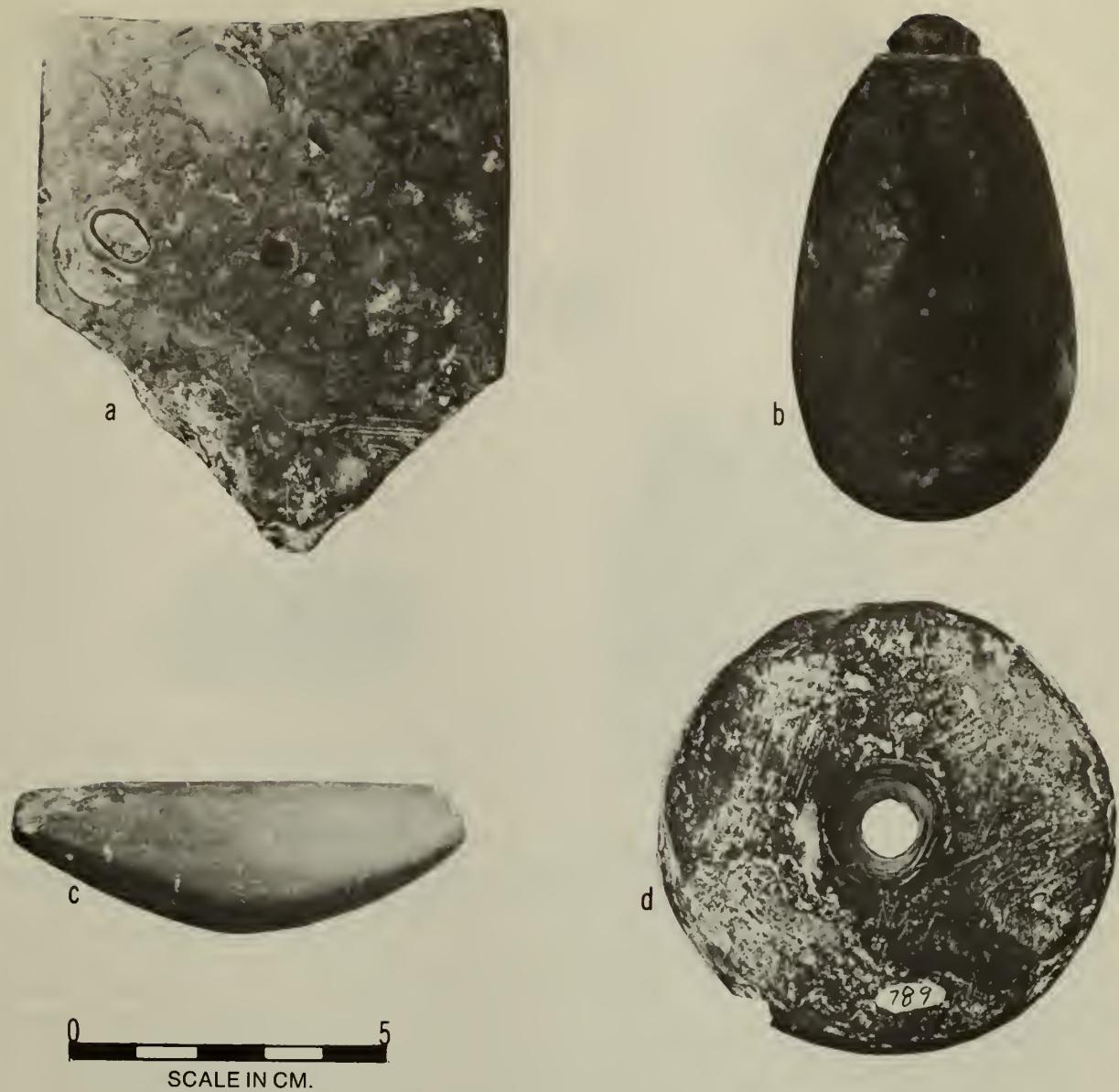
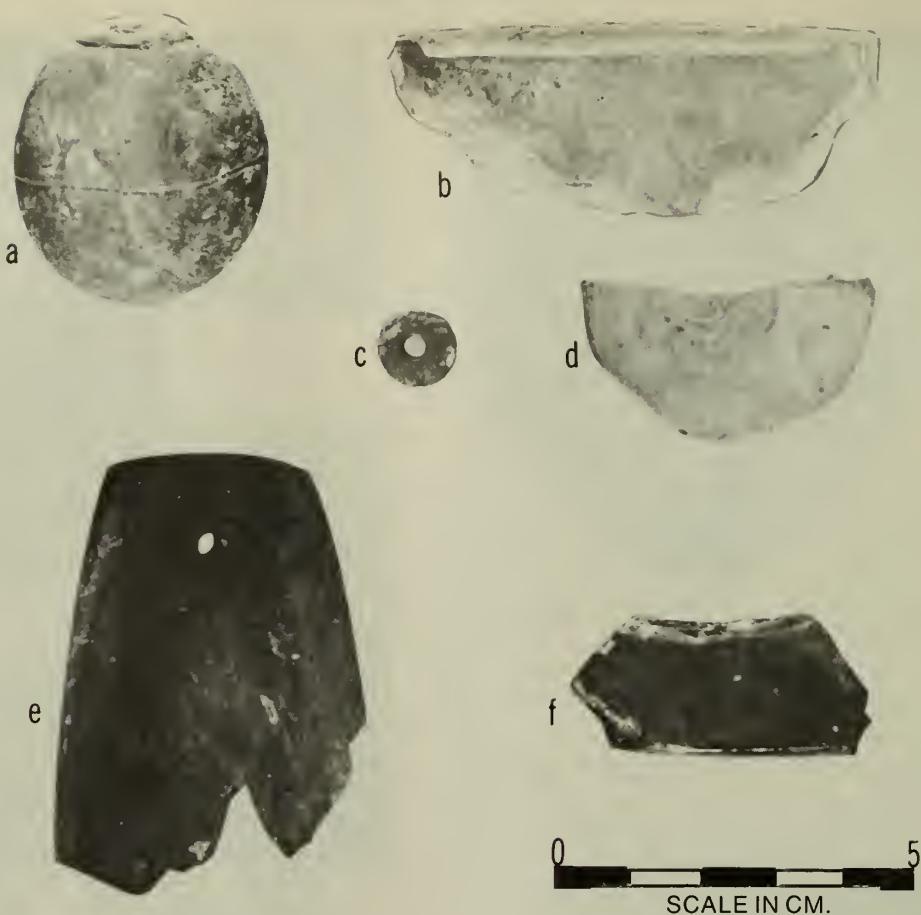


Figure 38.—Ground stone artifacts: gorget, a; plummet, b; boatstone, c; and spindle whorl, d.



**Figure 39.**—Ground stone artifacts: plummet, a; cut and polished limestone, b; bead, c; sandstone pebble with ground depression, d; gorget, e; and polished hematite slab, f.

field-Worley Site (DeJarnette, Kurjack, and Cambron, 1962, fig. 46).

**Bone pins.** These are highly polished specimens with either blunted or expanded heads (fig. 41c-e). Maximum popularity seems to be later than that of the simple split bone awl. The largest number came from Layer E, but they continued into Woodland times.

**Bone needles.** These artifacts are well-made bone tools with a perforation at one end (fig. 41f-h). They were concentrated in the Woodland Layer C, but a single example was found in each of the other layers.

**Bone perforators.** Two split bone tools with extremely slender points appear to have been fashioned for making tiny holes. Both examples came from Woodland levels.

**Blunt bitted tools.** A number of flat bone tools possessed rounded, blunt, spatula-like tips which

could have been used in the preparation of leather. The two illustrated in figure 40a and b are the largest of the lot. Most of them came from Archaic layers, with the maximum number from Layer G, but two were also found in Woodland contexts.

**Blunt headed awls.** Four split bone tools were found which had ground ends that were too blunt for use in perforation. Three of these widened immediately behind the tip and then constricted somewhat. It is possible that these were specialized tools used in weaving, or in net or cordage manufacture. Three came from Woodland layers and one from the Late Archaic.

**Fish bone awls.** Two fish spines (fig. 40e and f) were sharpened and polished, presumably for use as awls or perforators. Both were from the Woodland Layer C.

**Bone tube.** A single bone tube from a slightly

TABLE 14.—Distribution of bone, antler, and shell artifacts, Russell Cave.

Category	Layer B	Layer C	Layer D	Layer E	Layer F	Layer G	Totals
Split bone awls	2	12	9	23	23	29	98
Small mammal ulna awls					2	2	4
Bird bone awls	2	2	5	9	17	33	
Double-tapered awls	2	3		1	3		9
Bone pins	1	5	4	8	2		20
Bone needles	1	7	1	1	1		12
Bone perforators	1	1					2
Blunt-bit tools	2			2	4	6	14
Blunt-headed awls	3			1			4
Fish bone awls	2						2
Bone tube				1			1
Bird bone "gouge"				1			1
Perforated mandible						1	1
Bone fishhooks			1		2	1	4
Bone bead				1			1
Perforated teeth			6				6
Carved teeth	1			1		1	3
Bone cylinders	2						2
Miscellaneous cut bone and antler	2	1	1	1	2	3	10
Antler perforators					1	2	3
Antler flakers	2	2	3		2	4	13
Unidentified tips	1				2	2	5
Antler drifts	3	1			1	2	7
Antler beads				1		1	2
Shell pendants	2			1			3
Shell beads	1		1		1		3
Shell bands		2					2
Totals	9	49	31	49	53	75	266

curved bird bone was found in Layer E (fig. 41i). Both ends were cut and smoothed and the entire shaft was polished. An incised line encircles the shaft about 0.7 cm. from one end.

**Bird bone "gouge."** A small bird bone was obliquely cut at one end, producing a gouge-like edge (fig. 42m). This specimen came from Layer E.

**Perforated mandible.** A small fragmentary deer mandible from Layer G has three drilled holes along an oblique line in the gonal region (fig. 42r). One of these passes through the bone, but the other two do not penetrate to the inner side.

**Bone fishhooks.** A sharply angular specimen (fig. 42n) was found in Layer G, and there is no reason to suspect that this is not an Early Archaic specimen. It is presumably broken since it does not possess any modification to facilitate attachment to a line. In table 14, two specimens are assigned to Layer F, but both came from a square which was somewhat mixed and they may belong to a later period. One of these is the small grooved fishhook shown in figure 44c; the other (fig. 44d) is an incomplete specimen. The fourth fishhook, the larger specimen in figure 44b, came from the Early Woodland Layer D.

**Bone bead.** One large and somewhat irregular bone bead (fig. 42o) came from Layer E.

**Perforated teeth.** Six perforated teeth of the woodchuck (*Marmota monax*), apparently all from a single necklace, came from Layer D (fig. 43).

**Carved teeth.** One canine tooth from a black bear (*Ursus americanus*) with a groove cut in the proximal end (fig. 44a) was found in the Woodland Layer C. A canine tooth of a bobcat (*Lynx rufus*) from Layer G was thinned on both sides of the base, leaving a tang which could have served to seat the tooth in a shaft or handle. A beaver incisor from Layer E has a series of parallel notches cut in the lingual surface.

**Bone cylinders.** Two blunt-ended polished cylinders of solid bone were found in Layer C (fig. 42h and i).

**Miscellaneous worked bone and antler.** In all layers, a few fragments of cut bone and antler were found which could not be placed in a particular type. Several examples are shown in figure 42j-l.

**Antler perforators.** Three antler tines showed sharp unscarred tips and could have been used as perforators. One was a relatively long detached tine; the other two had been cut to a length of about 1 3/4 inches. Two came from Layer G and one from Layer F.

**Antler flakers.** Thirteen antler tines from virtually all layers of the site were classified as flakers. Most of the specimens have been polished all over, but several are polished only near the tip. Examples are illustrated in figure 41l and m.

**Unidentified tips.** A few tips of antler tines do not seem sharp enough to have been used as perforators, but also do not show the use scars of flakers.

**Antler drifts.** Seven cylindrical drifts of various sizes were found, of which two are illustrated in figure 41j and k. They came from both Woodland and Archaic levels.

**Antler beads.** Two crude beads cut from antler were found (fig. 42p and q). One of these came from Layer G and the other from Layer E.

**Shell pendants.** The four shell pendants found appear to be made from marine shell, but they have been so modified as to make this determination uncertain. One (fig. 42c) was a surface find, but a similar broken specimen came from Layer C. Also from a Woodland context is a small incised example (fig. 42d). The remaining specimen (fig. 42e) is tabulated as from Layer E. The square in which it was found, however, contained intruded material, and the object may be another Woodland item.



Figure 40.—Bone awls: blunt-bit bone awls, a and b; small mammal ulna awls, c and d; fish bone awls, e and f; split bone awls, g-k; and bird bone awls, l and m.



Figure 41.—Bone and antler artifacts: double-tapered bone awls, a and b; bone pins, c-e; bone needles, f-h; bone tube, i; antler drifts, j and k; antler flakers, l and m; and bone perforator, n.



Figure 42.—Bone and shell artifacts: shell beads, a and b; shell pendants, c–e; shell bands, f and g; bone cylinders, h and i; miscellaneous cut bone, j–l; bird bone "gouge," m; bone fishhook, n; bone beads, o–q; and perforated mandible, r.

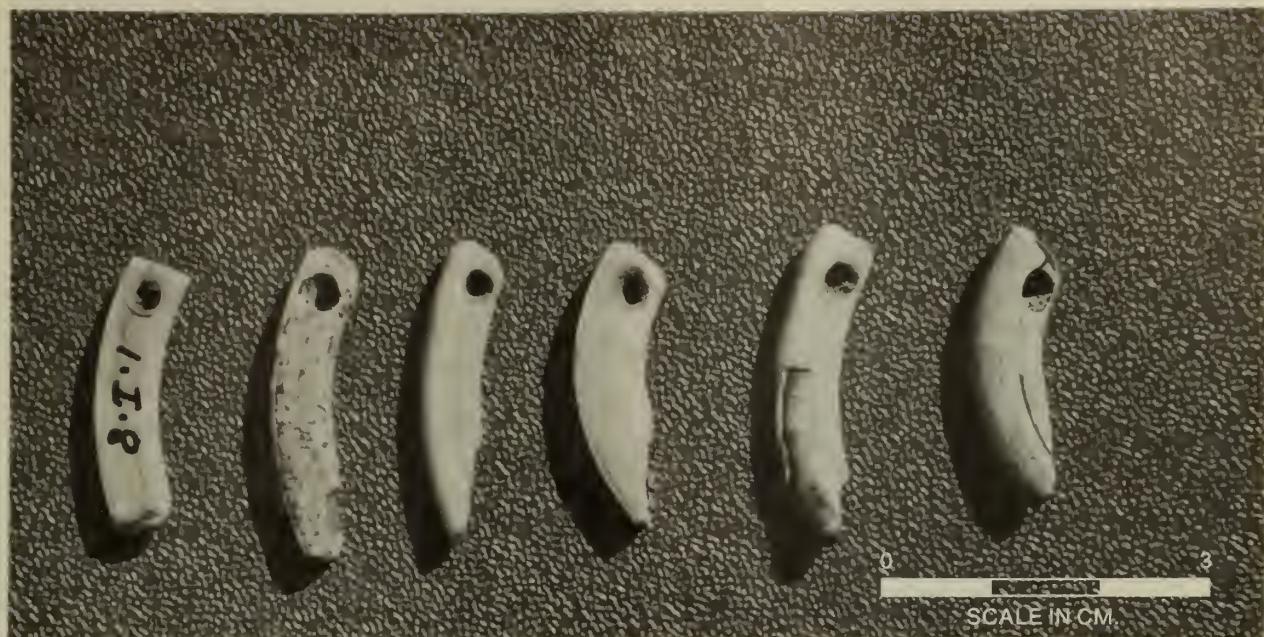


Figure 43.—Perforated woodchuck teeth.

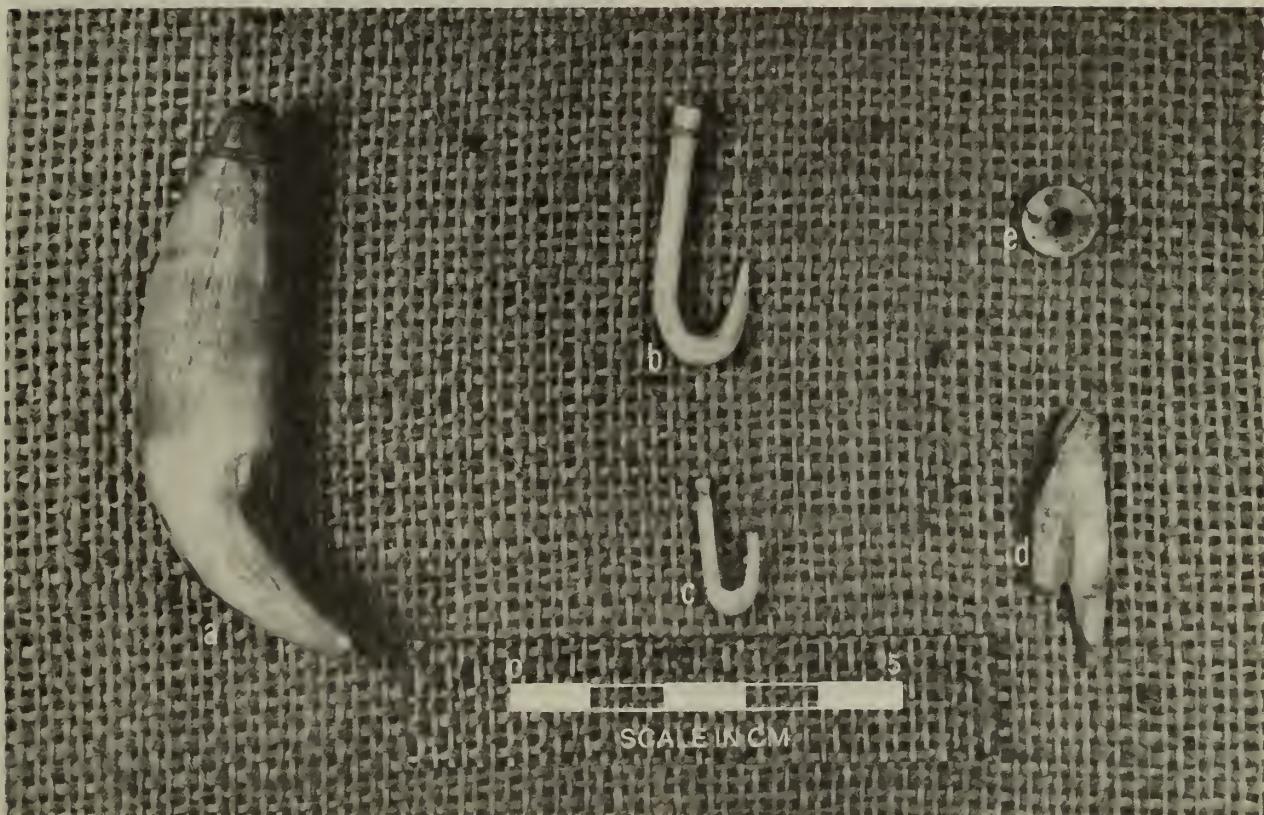


Figure 44.—Bone and shell artifacts: carved tooth of black bear, a; complete bone fishhooks, b and c; incomplete bone fishhook, d; and shell bead, e.



Figure 45.—Matting impression.

**Shell beads.** Two of the shell beads are flat polished disks, of a thickness suggesting marine origin. One (fig. 44e) came from Layer D; the other (fig. 42b), tabulated as Layer F, may have come from a Woodland pit. A large rough specimen from Layer B (fig. 42a) was obviously fashioned from the shoulder of a marine conch.

**Shell bands.** Two specimens from Layer C (fig. 42f and g) were cut and polished into stave-shaped bands. In each case, one end is finished smooth and the other is broken. The weight of the shell once again suggests a marine origin.

### Additional Items

One of our most interesting discoveries was the finding of four sections of clay bearing the impressions of matting. These came from Level 17 in Square S, which should have a Layer G provenience. However, we cannot completely rule out the possibility of intrusion from as high as Layer C or D, since three sherds of Mulberry Creek Plain were

taken from this level as was the Flint Creek point listed in table 8 as from Layer G.

The best example of this matting impression is illustrated in figure 45. The others are similar but less distinct. The clay on which the impressions were found was compacted more than the surrounding clay, but it had not been fired. The surfaces cleaned up rather well when dry, the disintegration of the matting apparently having formed a line of cleavage. The matting appears to have been made of split strips of cane, about 0.4 to 0.5 cm. in width, held together by cordage in a simple over-under lacing at about 1.0 cm. intervals.

A unique find is an unbarbed iron fishhook (fig. 46) from Layer A. This handmade specimen may be interpreted as an object dating from the Cherokee occupation of this section of the country or as evidence of the early American settlement period.



Figure 46.—Iron fishhook.

# PART 4: HUMAN SKELETAL REMAINS FROM RUSSELL CAVE

Charles E. Snow \* and  
Erik K. Reed

Many individuals contributed their time and talents to this study. I wish to express my gratitude to all of those who helped directly as research assistants, preparators, and experts, particularly the following members of the University of Kentucky Medical Center: Professor William R. Proffitt, for skull X-rays by cephalometer; Larry S. Kipper, for X-ray duplication; Harry Sloane, for illustrative photographs; Miss Iris Starrs, recorder and research assistant; and the stenographic staff of the Anatomy Department. A faculty Research Grant, No. 201-12-00000-12000, awarded by the Research Committee, University of Kentucky, 1965, generously provided the necessary funds.

I am obliged to Professor and Mrs. T. M. N. Lewis and Dr. Charles Faulkner of the University of Tennessee, Dr. David L. DeJarnette, and Mr. Roy S. Dickens, Jr., of Mound State Park, Moundville, Alabama, for their gracious cooperation in providing photographs of early crania for comparative study, and to Dr. J. Lawrence Angel, Division of Physical Anthropology, Smithsonian Institution, who generously furnished pre-publication data-metric and photographs—for the early California skulls from the Tranquillity Site (Angel, 1966).

I appreciate, too, the opportunity provided by the personal visit from and consultation with Professor Georg K. Neumann, Indiana University. We were able to check measurements and observational data values and the important classification of description (personal equation), which helped to standardize all values presented in the tables.

Grants by the National Park Service and through the Institutional fund of the University of Kentucky

\* Dr. Snow, Professor of Anatomy and Physical Anthropology at the University of Kentucky, died unexpectedly on October 5, 1967. His incomplete manuscript report was later finished by Dr. Reed, formerly Research Anthropologist, National Park Service. Essentially, the description and analysis of the skeletal material represent the efforts of Snow, and the observations on the skulls and the comparative discussion, including table 20, are the work of Reed.

—JWG.

Medical Center provided the necessary funds for the cleaning and preparing of the skeletal materials, for study of the photographic and radiographic illustrations, and for the assistance necessary in the preparation of the charts.—CES. 9/67.

## Procedures

The standard craniometric procedures were used in measuring and describing this little group of early Alabama Indians. Because of their early date, attention was directed toward as complete a recording as possible (see tables 15–19). Thus, for the major bones of the vault, midline arcs and their subtended chords were determined, such as bi-auricular and bi-asterionic diameters. Dental arch dimensions (anthropometric and odontometric) were taken and each tooth was carefully measured wherever possible.

Limb bones, vertebrae, hip bones, shoulder blades, and ankle bones were measured and described by the standard osteometric board and sliding calipers. Midshaft girths of limb bones were obtained by pressing dental tape into all surface channels and across ridges, pinching the ends off with small forceps, and measuring the length on a metric scale (osteometer).

Physiological lengths of the humerus and femur are the same as the *bicondylar length*, or functional maximum, measured from the bicondylar plane to the head of the bone. This functional bone-length of the tibia was taken by placing the distal articular

TABLE 15.—Summary of Russell Cave skeletons.

Burial No.	Sex	Age Group	Assessed Age**
1°	F	Old Adult	40–50 years
2*	M??	Infant	20–24 months
3	F??	Infant	10–12 months
4*	M	Adult	ca. 35 years
5	M??	Child	5–6 years
6	F??	Adolescent	12–14 years

\* Restorable skull, see illustrations.

\*\* Age criteria advanced to weigh retarded growth factors.

TABLE 16.—Cranial measurements, angles, and indices, Russell Cave skulls.

Measurements (mm.)	Burial 1 (Female)	Burial 4 (Male)
Glabello-occipital length	174	183
Maximum breadth	131	131
Basion-bregma height	130	133
Auricular height (porion-apex)	111	120
Basion-porion	24	21
Mean thickness left parietal	5.0	4.0
Horizontal circumference	487	500
Nasion-opisthion arc	360	374
Transverse arc	287	300
Basion-nasion length	94	100
Basion-prosthion length	88	93
Frontal chord	103	110
Minimum frontal diameter	85	90
Maximum frontal breadth	107	110
Total facial height	113.8	111.6
Upper facial height	62	63
Bizygomatic breadth	(123)	130
Midfacial breadth	93	105
Nasal height	48	46
Nasal breadth	24	26
Orbital height (mean)	33	31° only
Orbital breadth (maxillo-frontale)	44	43° only
Orbital breadth (dacyron)	38	40° only
Bi-orbital breadth	92	98
External palatal length	50	48
External palatal breadth	(56)	57
Condyllo-symphysial length of mandible	93	92
Bigonial breadth	90	92
Syphysis height (chin)	(25)	31
Minimum breadth of ascending ramus	30	34
Indices		
Length-breadth index	75.3	71.6
Length-height index	74.7	72.7
Breadth-height index	99.3	103.8
Mean height index	85.3	84.6
Length-auricular height index	63.8	65.7
Cranial module	145.0	149.0
Fronto-parietal index	64.8	68.7
Total facial index	(92.5)	85.85
Upper facial index	(50.4)	48.5
Nasal index	50.0	56.5
Orbital index (maxillo-frontale)	75.0	72.1
Orbital index (dacyron)	86.8	77.5
External palatal index	(112.0)	118.75
Cranio-facial index	93.9	99.3
Mandibular index	78.7	80.2

surface against a roundheaded screw extended 5 cm. out from the upright of the osteometer. The length to the lateral interior condyle edge (shin crest up) was measured with the block. The measured distance minus 5 cm. is the physiological length of this lower leg bone.

Special measurements taken on the Russell Cave skulls include the following:

1. *Basion-porion height*: Taken with coordinate-sliding calipers, skull base up; fixed and movable arm tips on the porion on each temporal bone. The instrument then is moved so that the coordinate attachment point can touch basion. The vertical distance below the periotic plane is thus determined.

TABLE 17.—Supplemental cranial measures, Russell Cave skulls.

Measurements (mm.)	Burial 1 (Female)	Burial 4 (Male)
Cranial capacity (water)	ca. 1255 cc	ca. 1300 cc
Nasion-bregma arc	113	123
Nasion-bregma length		110
Nasion-bregma chord	103	110
Nasion-bregma subtense		21
Frontal chord subtense	21	21
Bregma-lambda (sagittal) arc	119	134
Bregma-lambda (sagittal) chord	108	119
Lambda-opisthion arc	127	117
Lambda-opisthion chord	102	96
Bi-auricular diameter	108	109
Bi-asterionic diameter	112	109
Bizygomaticbreadth		93
Mandible, height of condyles	53	66
Mandible, thickness PM	11	13
Mandible, height PM	(26)	32
Mandible, intermental diameter	28.5	25
Degrees		Degrees
Total facial angle	82	87
Midfacial angle	85	90
Alveolar angle	65	76
Mandibular angle	119	105

2. *Subtense, internal orbital breadth*: Coordinate sliding calipers with fixed and movable arm tips on internal edges of fronto-malar suture—the instrument moved into position so that coordinate attachment point can contact nasion. The vertical projection of nasion forward from the plane established by caliper tips is recorded.

3. *Subtense, dacyral chord*: Coordinate sliding caliper tips placed on the dacyra—the coordinate calibrated tip is adjusted to the lowest point along the nasal arch, and the measurement recorded to the nearest millimeter.

The indices or proportions which can be easily computed from these measurements are self-explanatory.

4. *Subtense, minimum nasal breadth*: The coordinate caliper tips are placed along the borders of the nasal bones at their breadth—the tip of the coordinate attachment gage is moved down against the arch of the nasal bones and the dimension read and recorded.

5. *Breadth of the nasal bridge*: The coordinate caliper tips are adjusted to the maxillo-malar point on the inferior orbital borders.

6. *Height of the nasal bridge*: With the coordinate caliper on landmarks described in 5 above, the coordinate attachment height rod is so placed as to touch the tips of the nasal bones in the midline. This elevation above the plane between the maxillo-malar points on the orbital edges is the maximum of the

TABLE 18.—Morphological observations on crania and mandibles, Russell Cave skulls.

	Burial 1	Burial 2	Burial 4	Burial 5
General				
Gross size	small	(infant)	small	(child)
Vault cp with face	larger	very large	about equal	?
Horizontal shape	angular-oval	oval	rounded-oval	angular-oval
Transverse shape	sl. rounded, pentagonal	rounded	sl. rounded	sl. rounded
Lateral profile	oval	rounded-oval	oval	oval
Vault				
Suture pattern	sm. Wormian +	sm. med. + Wormian	medium	sm. to med.
Frontal bosses	small	medium	none	small
Frontal slope	small	none	average	small
Brow-ridges: Type	divided	none	torus	divided
Size	small	none	large	small
Glabella eminence	small	none	moderate	small
Parietal bosses	small	small	none	average
Lambdoidal flatness	average	sm. to none	small	small
Occipital fullness (curve) projection	large	small	moderate	large
Face				
Shape outline total	oval	?	rectangular	?
Orbit shape	shown	?		?
Orbit inclination	small	very small	average	?
Nasion depression	none	none	average	small
Nasal bones; Profile:				
Shape	concavo-convex	concave	concavo-convex	
Nasal:				
Sills	rhomboid	parallel	rhomboid	
Spine	sharp-rimmed	dull	dull	none
Cheek bones				
Size	average	average	average	average
Anterior projection (lower edge)	moderate	no	no	small
Lateral projection	project	equal	negative	negative
Jut (masseter muscle attached)	average	none	much	average
Suborbital fossa	no	no	yes	no
Submaxillary notch	average	average	small	average
small	small	average	none	no
Palate				
Shape	hyperbola	hyperbola	pinch hyperbola	
1++	medium	medium	medium-high	
Gross size	medium	medium	medium	small
Alveolar prognathism	small	negative	small	
Teeth: Incisors				
Mesio-lingual torsion ("winging")	yes	no <sup>41</sup>	yes	no <sup>41</sup>
Marginal ridges	?	yes <sup>up 18</sup>	yes	
Shoveling	?	slight	average	average
Teeth: General				
Wear	extreme	v. sl. "d"	much	light
Caries	1	none	none	none
Abscesses	1	none	none	none
Mandible				
Size	sm. med.	average	average	?
Prognathism	none	medium	medium	
Chin: Type	medium	medium	bilateral	
Size	wide emin.	+ open	average	
Mylohyoid canal	open	open	open	

nasal structure and is measured to the nearest millimeter.

7. *Height of the mandible (ascending ramus):* Measured on the goniometer by placing the body of the jaw against the upright. The line across the tops of the condyles is read from the scale and recorded to the nearest millimeter.

### The Specimens

Six burials were discovered during the 1962 excavations (table 15) but only three of them were even reasonably complete. All were located in the Archaic levels below Layer E, and in no instance could the outline of a burial pit be clearly discerned.

However, it is more likely that the burials were placed in pits than that they had earth mounded over them. The absence of a pit outline can be explained by the action of floodwaters and the seepage of outside earth into the space left by the disintegration of the flesh.

The absence of clearly defined burial pits with a determinable plane of origin complicates the ascription of the burials to the proper layer. Burial 2 lay at the base of the deposits in an area in which Layer G was not identified. It was originally ascribed to Layer F. However, the radiocarbon determination of  $8500 \pm 320$  B.P. is the earliest from these excavations and clearly indicates a Layer G placement.

TABLE 19A.—Measurements and indices of male post-cranial bones of Russell Cave Burial 4 and of Alabama and Florida series. Note: All measurements in mm. except stature (cm.)

	Russell Cave Burial 4	Left				Right				Range		
		Alabama		Florida		Russell Cave Burial 4	Alabama		Florida			
		No.	Av.	No.	Av.	No.	Av.	No.	Av.			
Humerus												
Maximum length	292	9	328.06	3	305.7	296	9	327.17	7	329.4	307-358	
Physio. length	290			3	303.3	293			5	319.8	297-345	
Max. diam. head	41	19	44.84	10	45.4	42	21	45.19	8	45.7	40-49	
Max. middle diam.	20	26	22.04	7	24.7	23	29	23.83	10	25.3	20-30	
Min. middle diam.	14	26	15.88	7	18.0	15	29	17.21	10	19.1	15-24	
Mid. circum.	56			7	69.1	64			10	73.4	57-81	
Mid. index	70.0			7	72.8	65.2			10	76.1	62-100	
Index robustness	19.2			3	21.3	21.6			7	23.1	19-27	
Con. diaph. angle				5	87.9°				11	85.8°	80-93°	
Ulna												
Maximum length	238	7	261.93	6	279.0	240	11	263.59	3	275.3	264-300	
Mid. circum.	37			6	51.7	40			4	55.2	48-61	
Index robustness	15.5			6	18.5	16.6			3	20.3	18-22	
Radius												
Maximum length	222	12	245.33	6	247.5	225	13	244.96	6	253.3	232-279	
Mid. circum.	34			6	42.0	34			6	47.6	34-52	
Index robustness	15.3			6	17.6	15.1			6	18.8	14-22	
Clavicle												
Maximum length	138	10	148.50	2	155.5	133	12	150.50	3	148.0	145-161	
Mid. circum.	33			2	45.0	35			3	44.6	42-48	
Index robustness	23.9			2	28.9	26.3			3	30.1	28-32	
Scapula												
Total Ht.	138					141						
Inferior Ht.	109					110						
Breadth	91					91						
Indices												
Total Ht. index	66.0					64.5						
Inferior Ht. index	83.5					82.7						
Pelvis												
Innominate height				4	211.8				2	199.0	198-214	
Innominate breadth				3	156.3				2	150.0	150-165	
Innominate index				3	71.7				2	75.4	72-80	
Pubis length				2	78.0				1	91.0	87-91	
Ischium length				2	88.5				3	91.0	87-91	
Ischio-pubic index				2	88.2				1	86.8	86-91	
Bi-eschiatic												
Bi-iliac breadth										116.0		
Min. bi-isch. br.												
Inlet, ant.-post.				1								
Inlet, lateral												
Brim index												
Inter spinus												
Sacral height				2						119.5	105-134	
Sacral breadth				2						114.5	113-116	
Sacral index				2						97.4	84-110	
Lumbar Vertebrae												
Anterior height										130.0		
Posterior height										133.0		
Lumbar index										102.3		
Femur												
Maximum length	18	443.61	3	432.3		18	440.72	3	425.0	401-448		
Bicondyl. length	7	433.50	3	424.0		7	432.79	3	418.3	393-440		
Max. diam. head	25	44.48	8	45.8		27	45.11	3	46.1	43-49		
Subtro. ant. post.	10	26.50	4	26.8		10	25.20	4	27.0	21-29		
Subtro. lateral	10	31.00	4	31.8		10	31.80	4	33.2	26-36		
Mid. ant. post.	37	30.03	5	34.2		37	31.32	4	31.5	30-39		
Mid. lateral	29	29.86	5	27.0		30	29.43	4	26.0	24-29		
Mid. circum.	30	25.10	6	92.2		31	25.03	4	89.5	83-98		
Subtro. Index			4	77.4				4	81.7	72-93		
Midshaft index	28	83.64	5	75.5		30	25.03	4	82.6	64-85		
Index robustness			3	20.4				3	20.8	19-23		
Tibia												
Maximum length	15	368.23	1	379.0		23	363.89	4	468.2	333-387		
Mid. ant. post.	23	33.04	4	35.0		22	32.59	4	34.7	32-40		
Mid. lateral	25	20.96	4	24.0		29	20.86	4	25.7	23-29		
Mid. circum.			4	92.7				5	99.0	88-111		
Midshaft index	22	64.05	4	68.6		25	64.16	4	74.2	64-76		
Index robustness			1	25.8				4	26.1	24-30		
Fibula												
Max. length	6	359.50	3	356.3		9	356.08	3	362.6	344-370		
Mid. circum.			3	53.3				3	57.6	50-60		
Index robustness			3	15.1				3	15.9	14-17		

TABLE 19A—Continued

	Left				Right				Range L & R
	Russell Cave Burial 4	Alabama	Florida	Russell Cave Burial 4	Alabama	Florida			
No.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	
<b>Calcareous</b>									
Max. length		4	75.2			9	73.4		73-84
Max. breadth		4	42.5			9	42.9		41-45
Project. height		4	44.2			9	45.0		42-54
Length-br. index		4	56.3			9	55.9		52-58
<b>Talus</b>									
Max. length		3	57.0			8	54.2		51-63
Max. breadth		3	45.3			8	47.8		42-50
Project. height		3	30.7			8	31.1		29-36
Length-ht. index		3	53.8			8	57.3		53-67
<b>Body Build</b>									
Humero-radial	76.0	4	77.75	2	79.0	76.5	4	77.25	2
Humero-clavicular	47.3			2	48.6	45.0			1
Humero-femoral	5	73.80	2	71.8		3	74.00	1	76.2
Tibio-femoral	2	82.00	2	86.5		3	83.50	1	84.6
Stature In centimeters					160.5(?)				168.9
									162-184

The remaining burials occurred in Layer F or high in Layer G. The excavators assumed that all of these could be attributed to Layer F for the following reasons. Pits which originated in Layer E and penetrated into earlier layers were clearly discernible; therefore, the burials did not originate above Layer F. Since the deepest burials, except for Burial 2, were not far within Layer G, and since they were assumed to have been made in pits, the burial pits must have originated in Layer F. This conclusion is supported by radiocarbon determinations of  $6250 \pm 190$  B.P. for Burial 1 and  $6310 \pm 140$  B.P. for Burial 4, which place them in the proper time range for Layer F. Also, Burial 4 was disturbed by a pit which contained a Morrow Mountain projectile point. All indications are that the five burials (other than Burial 2) were made during the period of Layer F, which is designated Middle Archaic in this report.

With several questionable exceptions, the burials recovered were not accompanied by grave offerings. They differed in this respect from the Morrow Mountain period burials in the Stanfield-Worley Bluff Shelter (DeJarnette, Kurjack, and Cambron, 1962, pp. 11-14 and 80-82). Since at least one of the Russell Cave burials was disturbed by a later Morrow Mountain pit, it is suggested that, while they were within the general time range which includes Morrow Mountain, these burials were the remains of persons having a different cultural affiliation.

### Burial 1

The most complete skeleton was that of an adult

female found in levels 16 and 17 of Squares T and N. Although a pit outline could not be seen, probably because of the action of floods, several stones under and near the skeleton, including one under the skull and another on which the right elbow rested, suggest that the burial was originally made in a pit.

Charcoal in relatively large quantities lay around the skeleton, and in many instances was tightly concentrated against the bones. Since the burial had obviously been made in the flesh, this charcoal must have come to rest against the bones subsequent to the disintegration of the body. Such disintegration would leave a relatively uncompacted area around the bones, and water action during periodic flooding could account for the concentration of the charcoal. But the charcoal must have been derived from nearby, and should date from the time of the burial. A sample (I-702) from this grave, dated at  $6250 \pm 190$  B.P., is regarded as acceptable.

The skeleton was flexed on the back, with the head to the north (fig. 47). The skull had leaned forward and was resting on the chest area. The right arm was crossed over the chest and the left arm was crossed inward behind the back. Both legs were tightly flexed to the left.

Most of the bones were present, but one major loss occurred during excavation. While the skeleton was being cleaned for removal, it was left overnight in an exposed condition. The next morning a portion of one of the leg bones was missing. Rodents were presumed to be the culprits, but a careful search of the cave failed to recover the missing bone. After

TABLE 19B.—Measurements and indices of female post-cranial bones of Russell Cave Burial 1 and of Alabama and Florida series. Note: All measurements in mm. except stature (cm.)

TABLE 19B—Continued

	Left				Right				Range	
	Russell Cave Burial 1	Alabama		Florida	Russell Cave Burial 1	Alabama		Florida		
		No.	Av.	No.	Av.	No.	Av.	No.	Av.	
Calcanus										
Max. length	64			3	67.0			4	68.0	64-70
Max. breadth	38			3	36.0			5	39.0	37-41
Project. height	39			3	41.7			4	40.8	39-43
Length-br. index	59.4			3	57.0			4	56.7	54-59
Talus										
Max. length	47			4	49.5			8	48.9	47-53
Max. breadth	39			4	42.2			8	43.4	39-45
Project. height	29			4	27.8			8	27.4	27-29
Length-ht. index	61.7			4	56.1			8	56.0	54-59
Body Build										
Humero-radial	73.5	3	77.67	2	77.6	2	77.00	1	80.0	77-80
Humero-clavicular	44.8			2	46.2			2	46.4	44-48
Humero-femoral	(69.6)	5	71.00	4	72.0	3	72.67	1	73.5	70-75
Tibio-femoral		4	83.00	1	84.0	2	83.50			84-84
Stature In centimeters					156.0			164.0		157-175

Figure 47.—Burial 1, *in situ*.

this, all skeletons left exposed overnight were shielded with a covering of hardware cloth. An attempt at revenge met with a singular lack of success. A highly regarded rodenticide was placed in trays at various points in the cave. The following morning the poison in each tray had been carefully covered with a pile of paper and other debris.

The burial is that of a small and rather lightly muscled woman, perhaps 40 to 50 years of age (figs. 48 and 49). This was the only complete skeleton, generally very well preserved, with the only unbroken skull. The length of the femur indicates a stature of about 156 or 157 cm., or around 5 feet 1½ inches, using the appropriate Trotter and Gleser (1952) and Genoves (1967) formulae.

The skull can best be described by its small diameters, arcs, girths, and, of course, volume (see metric data, tables 16 and 17). Viewed in the usual standard facial, side, top, back, and base views (fig. 50), the skull presents the rather smooth, rounded contours (typical sexual dimorphism) of some of the Shell Mound people described from numerous archeological sites in Alabama (Newman and Snow, 1942, p. 433 and pl. 311). Later, this "rugged type" was found to occur among the well-known Indian Knoll skeletons from Kentucky (Snow, 1948, p. 413 and fig. 23).

After the general impression of the entire skull has been perceived (table 18), perhaps the details of the extremely worn dentition strike the observer with peculiar force. Nothing quite as extreme in the extraordinary abrasion and attrition of all the teeth has ever come to our attention.

Figure 51 shows the dentine-stumps of the deeply worn crown surfaces. All enamel has long since been removed by the continued abrasive wear of the teeth, with the exception of the upright enamel still covering the walls of the crowns of the third molars (fig. 51c and d). The pattern of wear of the upper anterior teeth (central and lateral incisors and canines), viewed from the front, reflect the fact that in the normal mastication of food the muscle pull elevates the lower jaw as it is lifted against the upper teeth and rotary motion takes place. The most amazing phenomenon is the deep wear which not only abraded off the tooth crowns-enamel and dentine, but extended high (upper jaw) onto the very roots themselves (fig. 51b).

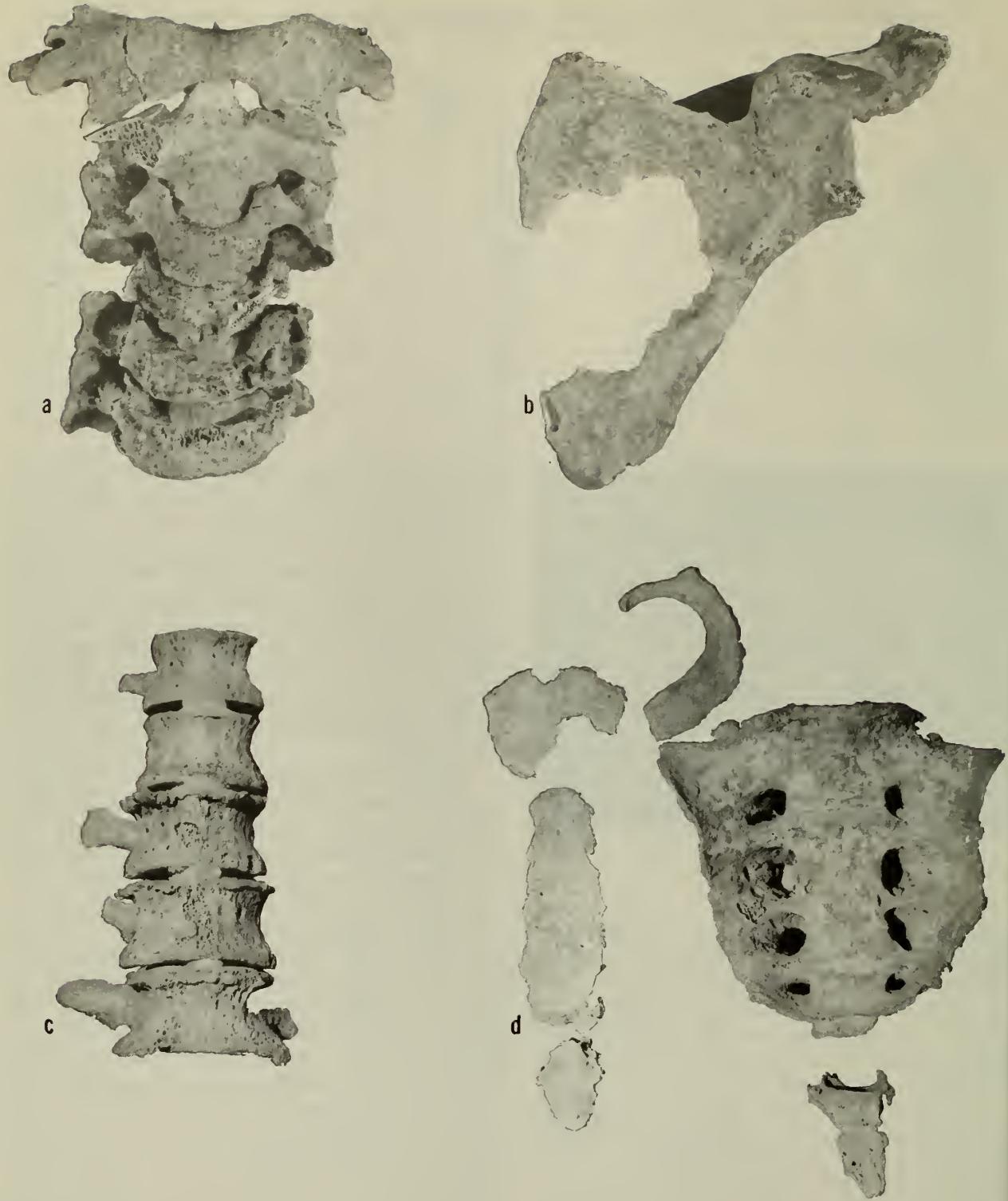
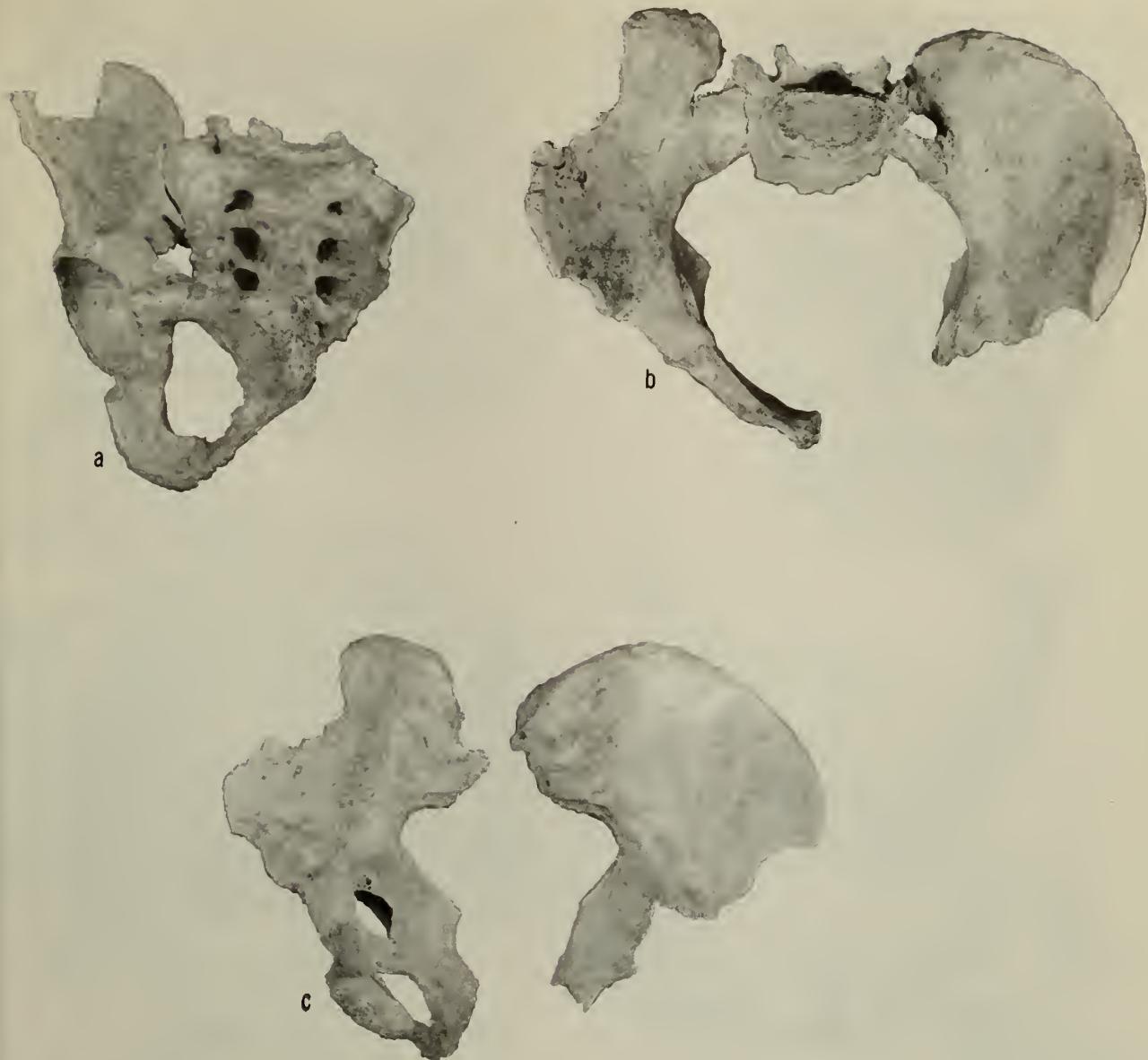


Figure 48.—Burial 1: upper six cervical vertebrae, a; left scapula, b; lumbar vertebrae, c; and major parts of the manubrium and left first rib, d.



**Figure 49.**—Pelvic bones of Burial 1: anterior view of right hip bone and articulated sacrum, a; top view showing the brim of the pelvis, b; and view of both hip bones from the midline aspect, c.

### Burial 2

The skeleton of an infant was found in a space between the rocks near the base (level 16) of Square H. The body had been placed face down in a crack in the rocks, with the head to the south and the vertebral column and pelvis in line to the north. The bones were removed very carefully, and it was noted that the soil around the burial was quite soft in comparison to the surrounding areas.

It is possible that the body was placed in the fissure and then covered over. However, a pit could have been dug downward alongside the portions of the rocks which projected above the surface as it existed at the time.

Burial 2 is the oldest Russell Cave specimen, having a radiocarbon age of  $8500 \pm 320$  B.P. It is represented by the remains of an infant with a restorable cranium and all of the deciduous teeth and the enamel formed crowns of the permanent first

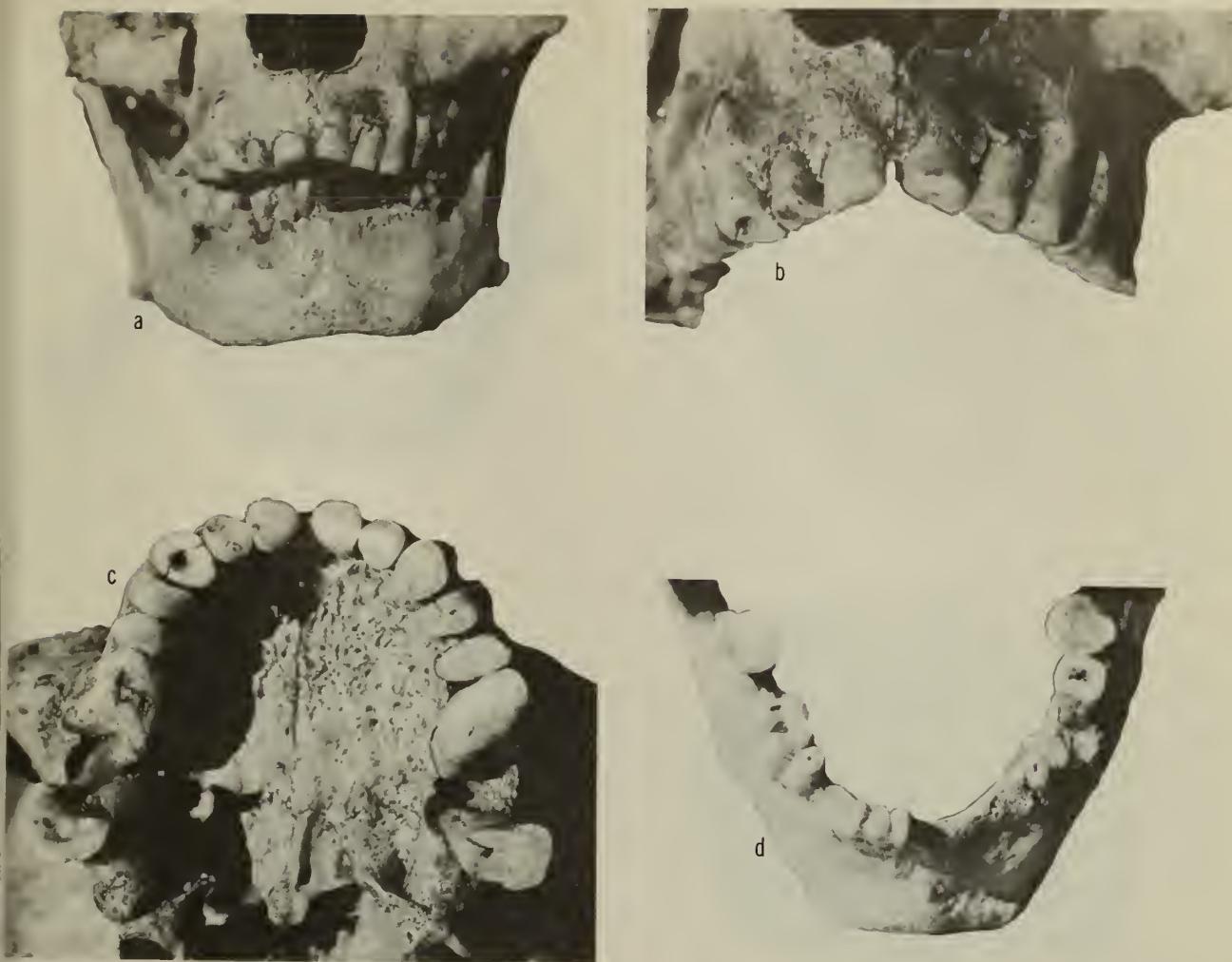


Figure 50.—Standard side, front, and base views of intact skull of Burial 1.

molars. The vertebral column, the right hip bone, and the right leg are well preserved, along with most of the left ribs and the left shoulder bones. Figures 52 and 53 show details of the skull and dentition.

The formation and the eruption of the deciduous teeth, as well as the limb bone lengths, provide the basis for an assessment of the age of this possible male as 20 to 24 months.

It should be pointed out that age determinations,



**Figure 51.**—Burial 1: facial view of both jaws, a; frontal view of upper teeth, b; and occlusal views of upper teeth, c and of lower teeth, d, showing deep wear on dentition.

based on evidence provided by documented skeletal material of known sex and age, probably represent the *average*—neither retarded nor accelerated growth. It is likely that these early Alabama Indians living on the edge of bare subsistence (cf. Angel, 1966) were slow or retarded growers and were behind the faster-paced, well-nourished American children of today, with which we compare most series. Thus the skeletal (and dental) age data reflect the poor subsistence level with its concomitant “faulty” nourishment. So we are probably on the safe side of the age determination, recognizing this important ecological factor and its bearing on the interpreted facts. In other words, these individuals are probably “older than they look.”

The skull, with its water capacity of approxi-

mately 730 cc., seems “normal” for a modern child of 2 years; outside of the usual infantile cranial contours (table 18), there is nothing of note with the possible exception of the well-preserved dentition. Of particular genetic importance is the presence of the cusps of Carabelli on the deciduous upper molars and the deciduous  $M_2$  cusp and  $M_1$  cusp pattern.

#### Burial 3

This burial was a fairly complete infant skeleton which apparently had been disturbed. The two skull fragments lay about 2½ feet northeast of the skull of Burial 1, in level 17 of Square T. A Morrow Mountain projectile point was found near the burial but its association cannot be accepted with confi-



Figure 52.—Standard views of skull of Burial 2. Note remarkable preservation of the fragile bones.



**Figure 53.**—Burial 2: a, maxilla, showing shovel-shaped incisors with marginal facial ridges; and b, crowns of right deciduous second molars, M-2, above, and first permanent molars, M-1, below. Extra paramolar cusps indicated by arrows.

dence. However, the point would not be out of line with the presumed period of interment.

#### Burial 4

The partial skeleton of an adult male was found in level 14 of Square V. The skeleton lay on its back in a flexed position (fig. 54), but the lower portion had been destroyed by a later pit (W13 Pit).

This burial suggested more strongly than any of the others that it had been interred in a pit. The presence of the lower part of the left femur near the

left arm indicated that the legs had been flexed upward. An irregular area heavily flecked with charcoal and clay surrounded the bones and was markedly different in appearance from the yellowish-tan clay of Layer G. The outline of the pit which later intruded upon the burial was readily seen.

Charcoal from the burial area yielded a determination of  $6310 \pm 140$  B.P., remarkably close to the determination for Burial 1. However, charcoal from the intruding pit was determined as  $7770 \pm 190$  B.P. For reasons discussed more fully in another portion of the report, the excavators are inclined to accept the determination for the burial and to reject the determination for the intrusive pit as probably representing charcoal re-incorporated in the pit fill.

The skull and the bones (fig. 55) indicate a middle-aged man of perhaps 30 to 35 years, evidently of small stature. The humerus and radius lengths, while not a very reliable basis for estimation, suggest a reconstructed stature of 160.5 cm., or about 5 feet 3 inches.

The almost perfectly preserved bones indicate a short and slender individual who was probably right-handed. It is interesting to note that both scapulae are well preserved (fig. 56) and so is the virtually complete hyoid bone. This man's teeth, like those of Burial 1, show extremely heavy dental wear, but the secondary dentine deposit had forestalled carious or other lesions (fig. 57).

#### Burial 5

This burial, recovered in levels 15 and 16 of Square Q, is represented by the fragmentary remains of a child, probably male, and 4 to 5 years of age, judging from the dentition. A partially restored skull indicates a rather large, very longheaded individual. The bones of the left shoulder and hip girdles are the best preserved. A left femoral length of 20.3 cm. corresponds to the probable age of about 5 years.

#### Burial 6

This burial was encountered as a scattered bundle of disarticulated bones lying at the base of level 14 in Square P. Leg bones, fragments of arm bones, clavicles, ribs, and vertebrae were the only bones present. The remains represent only a very fragmentary portion of the skeleton of an adolescent, possibly female, aged 11 to 13 years.



Figure 54.—Burial 4, *in situ*.

### Observations on the Skulls and Comparative Discussion

None of the skeletal material recovered from the Russell Cave shows any evidences of cradleboard flattening or other artificial deformation, and this is fortunate as it makes comparisons with other populations easier. There was some evidence at Indian Knoll, as in the later populations in the Southeast, that intentional cradleboard flattening of the head was practiced. As is well known, this was a common mark of later populations—especially those sedentary groups with a heritage characterized by agriculture, extensive use of trade materials, and the development of planned villages, often fortified.

Metrically and morphologically, in general appearance and specific features, the Russell Cave adult male, Burial 4, resembles the archaic (in a general, non-cultural sense) physical type or "Otamid" variety of Georg Neumann (1952), rather than later Southeastern groups (table 20). The adult female, Burial 1, might also fit reasonably well into the same general category but is not unlike archaic Southeastern material of the "Iswanid" variety.

There may well appear to be some contradiction between my statement describing the adult male of Burial 4 as belonging to the Otamid variety and Dr. Snow's description of the female, Burial 1, as obviously typical of the Shell Mound group such as Indian Knoll—the type series of the Iswanid variety. Had any such discussion of Burial 4 been included

in Dr. Snow's manuscript material, it might very possibly have emphasized the resemblance of the male also to some of the Shell Mound people—those of the "rugged type." The logical solution—aside from that of simply discounting my admitted (hereby) inclination to see Otamids as early and vice versa—is to assume that later occupants of most of North America descended, with slight and gradual modifications, from an original early population, and that hence at various times and places, over a considerable span, intermediate or transitional groups occurred, consisting of partially modified people or combining individuals of decidedly archaic type and individuals already changing toward somewhat different norms.

Nevertheless, the skeletal material from Russell Cave, dating somewhere between 6550 B.C. and 4350 B.C., can probably be added to the list of "archaic" specimens of more or less "Otamid" type. This includes the Union Lake skull, Michigan (probably from about 5000 B.C.); the Browns Valley (Minnesota) skeleton, of, probably, the sixth millennium B.C.; the Lansing man from Kansas (radio-carbon date of 4925 B.C.  $\pm$  135 years); the Medicine Crow Site skull from South Dakota (from between 5000 and 2000 B.C.); the late prehistoric or protohistoric skeletons from Torrington, Wyoming; material from Texas ranging from the Midland female—among the oldest known human bones found so far in North America—to the type series of the Otamid variety, which is a small collection from the Oso Site on the Gulf Coast, representing Karankawa Indians of the historic period; the early California group from the Tranquillity Site, and other Far Western material, of varying or uncertain date; and, finally, at least the male from the Upper Cave at Chou Kou Tien and perhaps other early East Asian finds.

There are certain similarities to modern Ainu, to Australian aborigines, and a broad general resemblance to late Upper Paleolithic material of western Asia (Hotu Cave in Iran), western and central Europe (e.g., Obercassel and Predmost), and northwestern Africa (Afalou, Mechta), as has been suggested by Hooton (1930, p. 255), Birdsall (1951), and Angel (1966, p. 15).

The complexion of these late Upper Paleolithic *Homo sapiens* groups is unknown, of course, but it is not unreasonable to assume that they may have been, like the vast majority of modern and recent mankind, brown-skinned with dark hair and eyes.

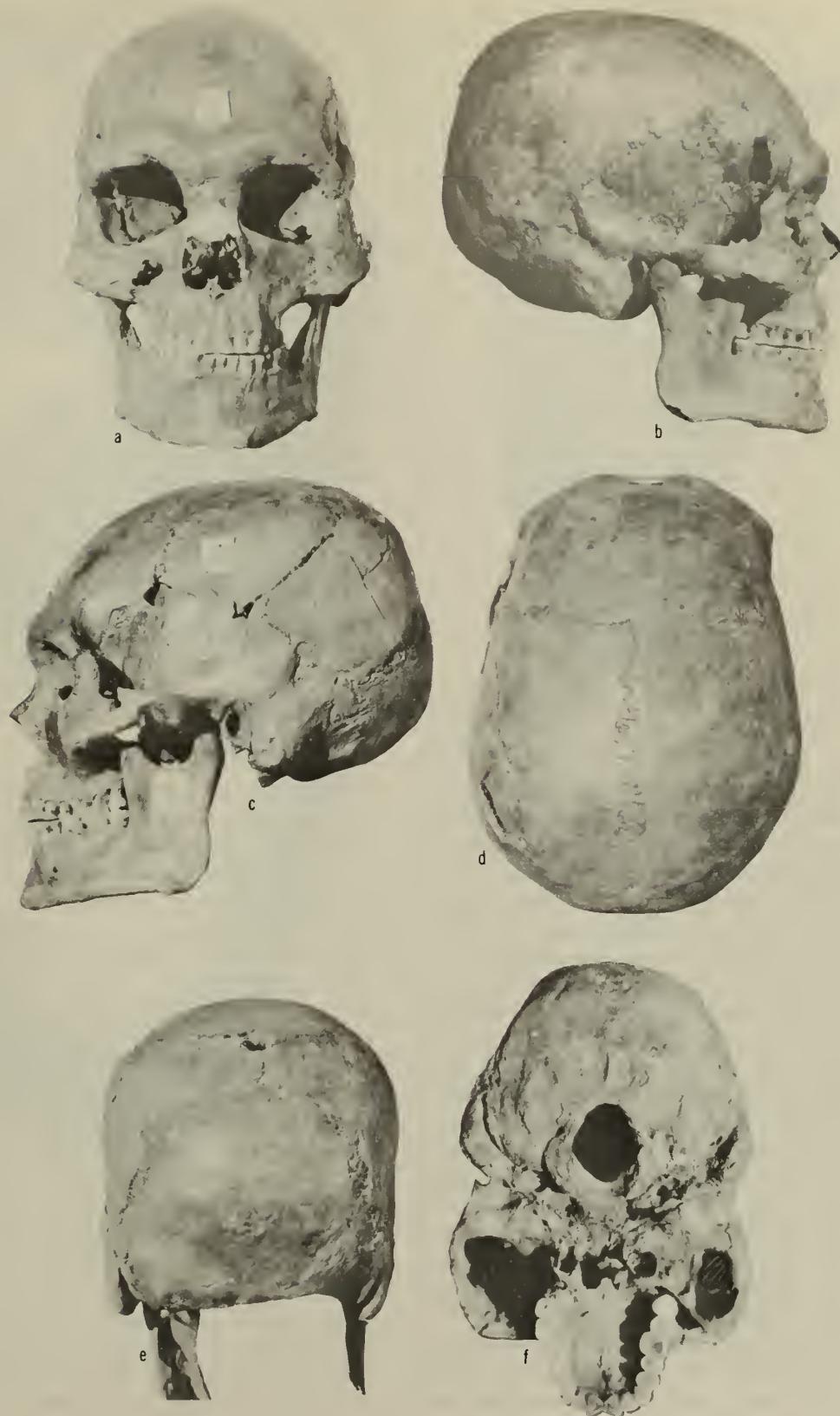


Figure 55.—Standard views of skull of Burial 4. Note ruggedness of surface relief and the square-set cheekbones and palate features.

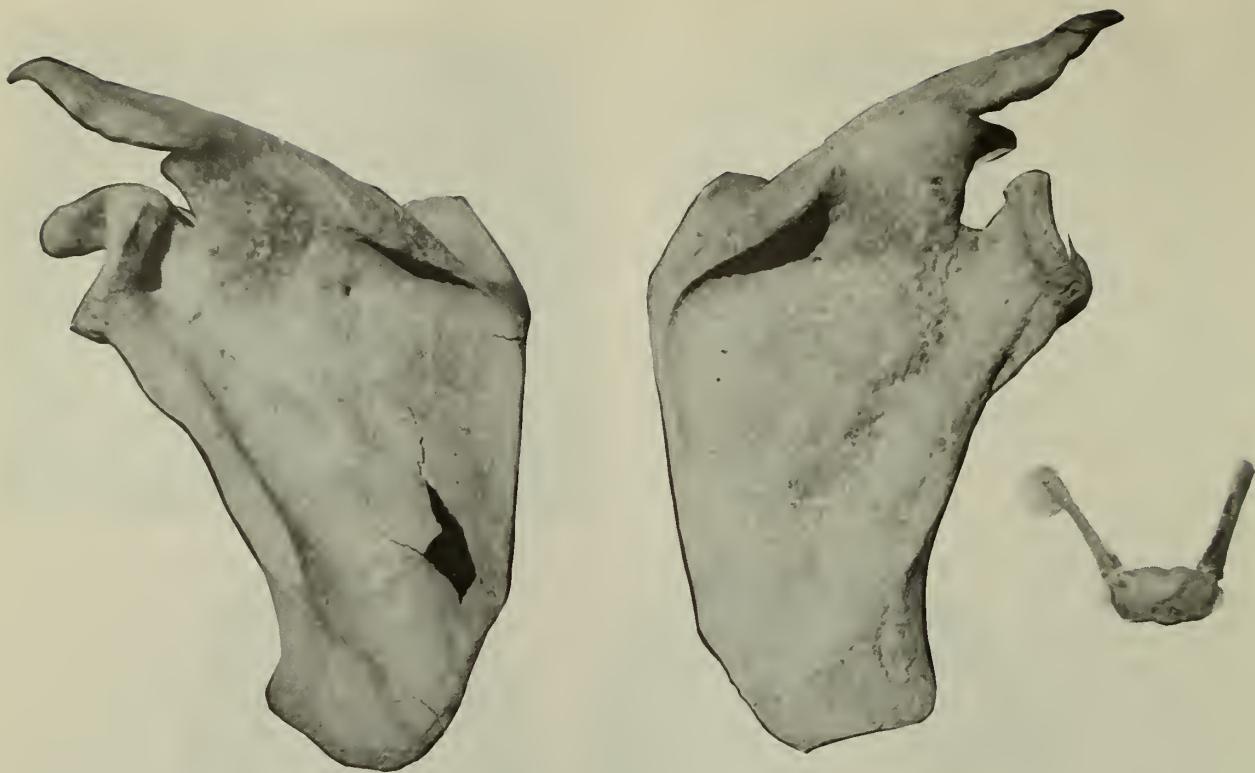


Figure 56.—Scapulae and hyoid bone of Burial 4.

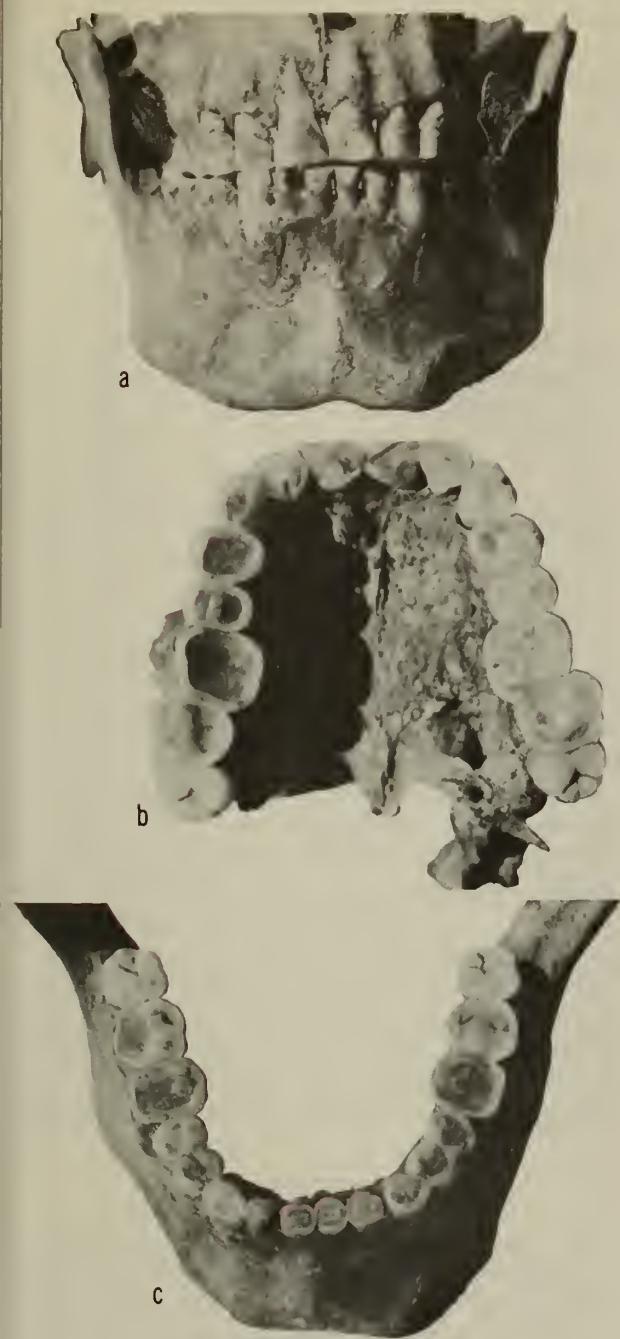
Most of the characteristics which have been pointed to in the past as indicating the Mongoloid affiliation of the American Indians are just such general features; the specialized Mongoloid traits such as blood type B and the inner epicanthic fold are largely or entirely lacking among Indians (aside from the Eskimos, who are true Arctic Mongoloids).

In the past, scholars favored the view that a series of immigrant groups, increasingly more definitely Mongoloid, moved into North America from Asia over a long period of time. According to the more recent dihybrid hypothesis of J. B. Birdsell (1951), American Indians in general represent a stabilized blend of the "Amurian" or Ainoid types and a strong element of "true" Mongoloid—a highly specialized type, probably late in evolving locally, somewhere in Central or Northern Asia, under the pressure of an extremely cold environment, and late in spreading widely; probably derived originally from very much the same general Upper Paleolithic type.

Georg Neumann has worked out still another hypothesis; namely that the majority of American Indian varieties have arisen by local variation from

a small original immigration of Upper Paleolithic (or Mesolithic) hunters of Otamid type, lacking or losing blood types A-B and that specialized groups with advanced culture based on food production greatly increased in numbers and expanded their territories. Then there was one later, separate immigration of rather definitely Mongoloid type (but lacking blood type B), the Deneids of northwestern North America—the Na-dené or Athapaskan-speakers—who contributed a massive infusion to the genetic makeup of Northern Plains tribes, possibly including blood type A, and produced the classical Prairid or Lakotid variety by mixture with various groups whose Algonquian (Blackfoot, Cheyenne, and Arapaho), Siouan (Dakota, etc.), and Caddoan (Pawnee and Arikara) speech survived.

Whatever the truth—or at any rate, the least unlikely hypothesis—as to the origins and racial affiliations of the American Indians, the skeletal materials from Russell Cave represent in the southeastern United States a widespread archaic physical type known in various parts of North America from different periods ranging from seven or eight thousand



years ago up to historic times, and they are among the very few positively dated ancient occurrences and are one of the oldest of these. The people were hunters and food collectors, muscular folk of rather small stature, with extensively worn teeth and other severe dental problems, and afflicted with osteoarthritis during the later years of life.

**Figure 57.**—Burial 4: frontal view of jaws, a; and occlusal views of upper jaw, b, and lower jaw, c, showing planes of wear.

TABLE 20.—Comparative data, male crania.

Russell Cave Burial 4 (Snow)	Indian Knoll, Kentucky Shell- mound, Archaic (Snow, 1948)		Eva Component, Tenn. (Lewis and Lewis, 1961)		Ct° 27 sub- mound, Ala. (Newman and Snow, 1942)		Texas Otamid, Oso and Big Bend (Woodbury, 1937)		Tranquillity, Calif. (Angel, 1966)*		
	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	
Cranial vault length	183	178.8	253	179.5	4	182.2	5	189.6	22	192.0	4
Maximum breadth	131	135.4	258	139.5	4	137.6	5	130.1	18	137.2	5
Auricular height	120	119.0	239	118.0	3	118.0	4	117.02	1	125.0	5
Basion-bregma height	133	139.9	227	136.0	2	138.0	3	134.4	10	141.6?	5
Minimum frontal breadth	90	91.6	264	94.0	3	92.6	5	91.3**		95.2	4
Bizygomatic breadth	130	136.0	246	140.0	1	138.7	3	136.0	11	136.5	4
Bigonial breadth	92	104.2	252	106.0	3	98.2	5	107.2**		98.2	4
Upper face height	63	70.0	233	68.8	3	72.5	4	70.2	9	68.4?	5
Chin height	31	34.4	223			34.4	5	36.0**		35.0	6
Nose height	46	51.0	246	49.6	3	52.5	4	51.8	12	51.5	4
Nose breadth	26	24.4	248	23.6	3	25.7	4	26.7	15	28.0	4
Orbit height	31	33.3	238	31.6	3	34.0	4	32.7	12	34.6	5
Cranial index	71.6	75.8	252	77.2	4	75.7	5	69.2	18	71.7	4
Fronto-parietal index	68.7	67.8	253			67.3	5	68.5**		69.4	4
Facial index	85.3	86.9	213	82.1	1	86.9	4	97.3		85.3?	4
Nasal index	56.5	48.0	230	47.6	3	47.9	4	51.7	12	54.4	4
Orbital index	73.2	78.4	232	84.3	3	85.9	3	85.82**		87.8	4
Face profile angle	87.0	84.8	170	74.5	2	83.5	4			85.5	4

\*Includes female measurements increased by 6 percent

\*\*Oso only

# PART 5: VERTEBRATES FROM RUSSELL CAVE

Robert D. Weigel

J. Alan Holman

Andreas A. Paloumpis

In the following report, comments pertaining to each group of vertebrates are by the individual who identified those remains: mammals and birds, Robert D. Weigel; reptiles and amphibians, J. Alan Holman; and fish, Andreas A. Paloumpis.

Of approximately 30,000 bones and fragments submitted for analysis, about 10 percent were identifiable. Most of the fragments are small pieces of the long bones of deer and turkey. The minimum number of individuals was determined by the larger number of either a left or right element, and by size difference in the case of fish. A few lots were composed of bones from two or more layers, and this material is not included in the tables although it was carefully examined for evidence of species not included in the faunal lists. Stratigraphically distinct layers make it possible to list separately the total number of identified pieces, minimum numbers of individuals, and their provenience.

Broyles (1958) reported at least 24 species from Russell Cave; the present paper lists 66 species. Some of these are small forms that live in caves today and probably were not eaten by man. The others probably represent a typical sample of animals that were utilized by the cave-dwelling people.

## Mammals and Birds

Mammals and birds (tables 21 and 22) comprised the bulk of the vertebrates consumed at Russell Cave. In considering the extent to which various species were utilized as food, it is important to take into account the total biomass represented by each species (White, 1953). In layer G, for example, there are remains of at least 20 turkeys and 155 squirrels. Although there are nearly eight times as many squirrels as turkeys, the former provided only about half as much food. In the larger animals, such as deer and bear, the disparity between numbers of individuals and biomass is even greater.

On the basis of biomass, deer, turkey, raccoon,

squirrel, and bear comprised the major portion of the vertebrate diet. According to Parmalee (1962), occupants of the Stanfield-Worley Bluff Shelter subsisted primarily on deer, squirrel, and raccoon. This northwestern Alabama site is comparable to Russell Cave in age and is also near the Tennessee River.

Deer remains are common in all layers and most parts of the skeleton are represented, including hoofs. Some of the jaws were aged, using the methods of Severinghaus (1949, 1950). Most of the deer were over 1 year old and some appeared to be over 5 years old. Deer are usually born in May or June. This information, together with the estimated ages of some specimens, permits an approximation of the time of year when the animals were killed. Some deer from Layers F and B were probably killed in the fall or winter months. Most of the long bones were broken, probably for the extraction of marrow. This partly accounts for the large number of fragments.

Remains of the gray squirrel are especially numerous. This animal was also abundant at the Stanfield-Worley Bluff Shelter (Parmalee, op. cit.). These squirrels presently inhabit wooded hillsides, lower slopes of mountains, bottomlands, and swamps where nut-bearing trees (oak and hickory) are common. Rarely do they occur in pine woods. Gray squirrels are plentiful in the area now and the numerous remains from Russell Cave suggest they were equally abundant during the time early man inhabited the cave.

The black bear is the largest animal represented, occurring in all layers except Layer G. It was not found among the remains from the Stanfield-Worley Bluff Shelter (Parmalee, op. cit.).

The presence of porcupines is of zoogeographical interest as this animal now ranges only as far south as West Virginia. Porcupine remains were also found at the Stanfield-Worley Bluff Shelter by Parmalee (op. cit.) and he has commented on the significance of its occurrence in Alabama in prehistoric times

TABLE 21.—Mammals from Russell Cave.

	Layers							Totals
	G	F	E	D	C	B	A	
<b>Number of bones or fragments identified:</b>								
<i>Didelphis marsupialis</i> , Opossum	11	2	2	1	5	3	0	24
<i>Scalopus aquaticus</i> , Eastern Mole	0	0	1	0	0	0	0	1
<i>Sylvilagus floridanus</i> , Eastern Cottontail	32	14	1	1	6	3	0	57
<i>Sciurus carolinensis</i> , Gray Squirrel	788	47	9	6	18	29	11	908
<i>Sciurus</i> , cf. <i>S. niger</i> , Fox Squirrel	1	2	0	0	0	0	1	4
<i>Marmota monax</i> , Woodchuck	5	2	2	1	2	2	0	14
<i>Tamias striatus</i> , Chipmunk	11	4	1	1	0	3	0	20
<i>Castor canadensis</i> , Beaver	0	0	0	0	2	1	0	3
<i>Oryzomys palustris</i> , Eastern Rice Rat	1	0	0	0	10	0	0	11
<i>Neotoma floridana</i> , Florida Packrat	2	0	1	0	0	1	0	4
<i>Ondatra zibethicus</i> , Muskrat	1	0	0	0	0	0	0	1
<i>Erethizon dorsatum</i> , Porcupine	14	4	0	0	2	0	0	20
<i>Canis</i> sp.	2	3	0	1	0	0	0	6
<i>Urocyon cinereoargenteus</i> , Gray Fox	9	3	1	0	2	1	0	16
<i>Ursus americanus</i> , Black Bear	0	1	3	1	5	26	10	46
<i>Procyon lotor</i> , Raccoon	63	11	7	5	14	4	1	105
<i>Mephitis mephitis</i> , Striped Skunk	15	5	1	0	5	2	1	29
<i>Lutra canadensis</i> , River Otter	2	0	0	0	0	0	0	2
<i>Felis concolor</i> , Mountain Lion	0	0	1	0	1	1	0	3
<i>Lynx rufus</i> , Bobcat	5	1	0	0	2	0	1	9
<i>Mylohyus</i> , cf. <i>M. nasutus</i> , Extinct Peccary	2	0	0	0	0	0	0	2
<i>Odocoileus virginianus</i> , Whitetail Deer	140	93	52	48	108	70	18	529
<b>Number of individuals represented (minimal):</b>								
<i>Didelphis marsupialis</i> , Opossum	2	1	1	1	2	1	0	8
<i>Scalopus aquaticus</i> , Eastern Mole	0	0	1	0	0	0	0	1
<i>Sylvilagus floridanus</i> , Eastern Cottontail	3	3	1	1	1	1	0	10
<i>Sciurus carolinensis</i> , Gray Squirrel	155	15	3	1	3	4	3	184
<i>Sciurus</i> , cf. <i>S. niger</i> , Fox Squirrel	1	1	0	0	0	0	1	3
<i>Marmota monax</i> , Woodchuck	1	1	1	1	1	1	0	6
<i>Tamias striatus</i> , Chipmunk	8	1	1	1	0	1	0	12
<i>Castor canadensis</i> , Beaver	0	0	0	0	1	1	0	2
<i>Oryzomys palustris</i> , Eastern Rice Rat	1	0	0	0	1	0	0	2
<i>Neotoma floridana</i> , Florida Packrat	1	0	1	0	0	1	0	3
<i>Ondatra zibethicus</i> , Muskrat	1	0	0	0	0	0	0	1
<i>Erethizon dorsatum</i> , Porcupine	4	1	0	0	1	0	0	6
<i>Canis</i> sp.	1	1	0	1	0	0	0	3
<i>Urocyon cinereoargenteus</i> , Gray Fox	1	1	1	0	2	1	0	6
<i>Ursus americanus</i> , Black Bear	0	1	1	1	1	2	2	8
<i>Procyon lotor</i> , Raccoon	5	3	1	1	3	1	1	15
<i>Mephitis mephitis</i> , Striped Skunk	3	2	1	0	2	1	1	10
<i>Lutra canadensis</i> , River Otter	1	0	0	0	0	0	0	1
<i>Felis concolor</i> , Mountain Lion	0	0	1	0	1	1	0	3
<i>Lynx rufus</i> , Bobcat	1	1	0	0	1	0	1	4
<i>Mylohyus</i> , cf. <i>M. nasutus</i> , Extinct Peccary	1	0	0	0	0	0	0	1
<i>Odocoileus virginianus</i> , Whitetail Deer	8	3	2	2	7	5	1	28

(Parmalee, 1963). During the Pleistocene, porcupines lived as far south as Florida (Olsen, 1959).

Member of the genus *Canis* (dog, wolf, coyote) are represented by such meager remains as to suggest these animals were very little used.

Of special interest is the presence of two molar teeth (right  $M^2$  and  $M^3$ ) of an extinct peccary (*Mylohyus*) recovered from the bottom of Layer G. According to Stanley Olsen of the University of Arizona, who kindly examined the teeth, they most closely resemble those of *M. nasutus*. The genus *Mylohyus* occurs in numerous localities in the eastern United States, but until now no specimens were known from Alabama (Semken and Griggs, 1965). As is the case at Russell Cave, this peccary is commonly found associated with woodland species. Although widespread evidence suggests that numerous

Pleistocene mammals survived until Post-Pleistocene times, it is particularly interesting to find this animal associated with human remains at Russell Cave in the period, 5000 to 7000 B.C.

With the exception of turkey and passenger pigeon, few bird remains were recovered. Turkeys were a major source of food for the cave inhabitants. Among the numerous turkey remains, which include all parts of the skeleton, there are a few bones which belonged to juvenile individuals; the majority, however, came from adult birds. Turkeys frequent wooded hillsides and swampy terrain.

The passenger pigeon was once abundant in eastern United States. Thousands migrated through Alabama during the spring and fall and many remained throughout the winter to feed on mast. According to Schorger (1955), these birds were taken at their

TABLE 22.—Birds from Russell Cave.

	Layers							Totals
	G	F	E	D	C	B	A	
<b>Number of bones or fragments identified:</b>								
<i>Gavia immer</i> , Common Loon	1	0	0	0	0	0	0	1
<i>Anas cf. A. discors</i> , Blue-winged Teal	0	1	0	0	0	0	0	1
<i>Aix sponsa</i> , Wood Duck	4	0	0	0	0	0	0	4
<i>Buteo lineatus</i> , Red-shouldered Hawk	1	0	0	0	1	0	0	2
<i>Buteo jamaicensis</i> , Red-tailed Hawk	6	1	0	0	0	0	0	7
<i>Colinus virginianus</i> , Quail	2	0	0	0	0	0	0	2
<i>Meleagris gallopavo</i> , Turkey	248	40	9	7	24	19	5	352
<i>Ectopistes migratorius</i> , Passenger Pigeon	11	13	3	0	1	0	0	28
<i>Strix varia</i> , Barred Owl	1	0	0	0	0	0	0	1
<i>Caprimulgus carolinensis</i> , Chuck-will's Widow	0	1	0	0	0	0	0	1
<i>Centurus carolinus</i> , Red-bellied Woodpecker	0	1	0	0	0	0	0	1
<i>Corvus corax</i> , Raven	1	0	0	0	0	0	0	1
<i>Corvus brachyrhynchos</i> , Crow	1	0	0	0	1	0	0	2
<b>Number of individuals represented (minimal):</b>								
<i>Gavia immer</i> , Common Loon	1	0	0	0	0	0	0	1
<i>Anas cf. A. discors</i> , Blue-winged Teal	0	1	0	0	0	0	0	1
<i>Aix sponsa</i> , Wood Duck	1	0	0	0	0	0	0	1
<i>Buteo lineatus</i> , Red-shouldered Hawk	1	0	0	0	1	0	0	2
<i>Buteo jamaicensis</i> , Red-tailed Hawk	2	1	0	0	0	0	0	3
<i>Colinus virginianus</i> , Quail	2	0	0	0	0	0	0	2
<i>Meleagris gallopavo</i> , Turkey	20	5	2	2	3	1	1	34
<i>Ectopistes migratorius</i> , Passenger Pigeon	2	4	2	0	1	0	0	9
<i>Strix varia</i> , Barred Owl	1	0	0	0	0	0	0	1
<i>Caprimulgus carolinensis</i> , Chuck-will's Widow	0	1	0	0	0	0	0	1
<i>Centurus carolinus</i> , Red-bellied Woodpecker	0	1	0	0	0	0	0	1
<i>Corvus corax</i> , Raven	1	0	0	0	0	0	0	1
<i>Corvus brachyrhynchos</i> , Crow	1	0	0	0	1	0	0	2

nesting sites by Indians who knocked the young out of the nests with poles. Some were netted during migration and others were killed by blows of stones or other weapons at roosting sites. The specimens represented in the Russell Cave material were killed during migration or in winter since the cave is south of what was once the main nesting area and none of the birds were juvenile.

The common loon and teal are aquatic and were probably taken from the Tennessee River. The wood duck typically inhabits wooded, wet river bottoms and backwater areas where it nests in the cavities of trees and stumps. The red-tailed and red-shouldered hawks, barred owl, and red-bellied woodpecker commonly inhabit swamps and bottomland timber. With the exception of the passenger pigeon, all of the birds occur as residents or migrants in the area today.

### Amphibians and Reptiles

Amphibians and reptiles are represented by 545 identified fragmentary specimens representing a minimum number of 64 individuals and 19 species (table 23). Turtles and frogs may have been used as food by the people of Russell Cave, but there is little indication that the other amphibians and rep-

tiles were eaten by man. In fact, these forms probably represent either occasional migrants or animals that actually lived in the cave from time to time.

Amphibians are represented by anurans only. The absence of urodele remains is indeed surprising considering the fact that many species of salamanders frequent caves today. The bullfrog, the green frog, and the leopard frog are eaten by modern humans, but the American toad and the eastern spadefoot have poisonous skin secretions that irritate the mucous membranes of humans. Moreover, two almost complete individuals of the eastern spadefoot (one in Layer B and one in Layer D) were found in place. Living bullfrogs, leopard frogs, toads, and eastern spadefoots are found in Florida caves today (Holman, 1958). Thus the possibility exists that none of the Russell Cave amphibians were eaten by man.

Reptiles are represented by turtles and snakes only. It seems possible that many of the turtles were brought into the cave and eaten by man. Box turtles are terrestrial animals and probably were picked up as they wandered through the woods. Some scratches that could have been made by a tool occur on the inner surface of a complete carapace of a box turtle from Layer C.

Remains of the pond slider and the spiny soft-

TABLE 23.—Amphibian and reptile species from Russell Cave.

	Layers							Totals
	G	F	E	D	C	B	A	
<b>Number of bones or fragments identified:</b>								
<i>Scaphiopus holbrookii</i> , Eastern Spadefoot	0	4	2	51	1	27	0	85
<i>Bufo americanus</i> , American Toad	0	0	1	0	0	0	0	1
<i>Rana catesbeiana</i> , Bullfrog	0	0	0	0	2	0	0	2
<i>Rana clamitans</i> , Green Frog	0	4	0	0	0	0	0	4
<i>Rana pipiens</i> , Leopard Frog	1	0	0	0	0	0	0	1
<i>Chelydra serpentina</i> , Snapping Turtle	0	0	0	0	1	0	0	1
<i>Sternotherus odoratus</i> , Stinkpot	1	0	0	0	0	2	0	3
<i>Kinosternon subrubrum</i> , Mud Turtle	0	5	0	0	6	0	0	11
<i>Terrapene carolina</i> , Box Turtle	144	19	6	25	40	44	12	290
<i>Graptemys pseudogeographica</i> , False Map Turtle	0	0	0	0	4	0	0	4
<i>Pseudemys scripta</i> , Pond Slider	9	1	5	3	1	8	0	27
<i>Trionyx spinifer</i> , Eastern Spiny Softshell	0	0	4	1	5	3	2	15
<i>Thamnophis sirtalis</i> , Common Garter Snake	1	0	0	0	0	0	0	1
<i>Coluber constrictor</i> , Racer	0	0	0	0	0	2	0	2
<i>Masticophis flagellum</i> , Coachwhip	0	0	0	0	1	0	1	2
<i>Elaphe guttata</i> , Corn Snake	0	1	0	0	0	4	0	5
<i>Pituophis melanoleucus</i> , Pine Snake	0	1	0	0	0	0	0	1
<i>Agkistrodon contortrix</i> , Copperhead	0	0	0	0	0	3	0	3
<i>Crotalus horridus</i> , Timber Rattlesnake	38	7	4	4	8	21	6	88
<b>Number of individuals represented (minimal):</b>								
<i>Scaphiopus holbrookii</i> , Eastern Spadefoot	0	2	2	2	1	2	0	9
<i>Bufo americanus</i> , American Toad	0	0	1	0	0	0	0	1
<i>Rana catesbeiana</i> , Bullfrog	0	0	0	0	1	0	0	1
<i>Rana clamitans</i> , Green Frog	0	1	0	0	0	0	0	1
<i>Rana pipiens</i> , Leopard Frog	1	0	0	0	0	0	0	1
<i>Chelydra serpentina</i> , Snapping Turtle	0	0	0	0	1	0	0	1
<i>Sternotherus odoratus</i> , Stinkpot	1	0	0	0	0	1	0	2
<i>Kinosternon subrubrum</i> , Mud Turtle	0	1	0	0	1	0	0	2
<i>Terrapene carolina</i> , Box Turtle	6	3	1	1	3	3	2	19
<i>Graptemys pseudogeographica</i> , False Map Turtle	0	0	0	0	1	0	0	1
<i>Pseudemys scripta</i> , Pond Slider	1	1	1	1	1	1	0	6
<i>Trionyx spinifer</i> , Eastern Spiny Softshell	0	0	1	1	1	1	1	5
<i>Thamnophis sirtalis</i> , Common Garter Snake	1	0	0	0	0	0	0	1
<i>Coluber constrictor</i> , Racer	0	0	0	0	0	1	0	1
<i>Masticophis flagellum</i> , Coachwhip	0	0	0	0	1	0	1	2
<i>Elaphe guttata</i> , Corn Snake	0	1	0	0	0	1	0	2
<i>Pituophis melanoleucus</i> , Pine Snake	0	1	0	0	0	0	0	1
<i>Agkistrodon contortrix</i> , Copperhead	0	0	0	0	0	1	0	1
<i>Crotalus horridus</i> , Timber Rattlesnake	1	1	1	1	1	1	1	7

shell are moderately common. These species are aquatic and probably came from the Tennessee River. Softshell bones from Layers B, D, and E appear burned. The stinkpot, mud turtle, false map turtle, and snapping turtle are represented by isolated fragments. These species are also aquatic and probably came from the Tennessee River. The soft-shell turtle and the snapping turtle are widely used as food by man today.

Of the snakes, only the timber rattlesnake is found in every layer. The other snakes are represented by isolated fragmentary remains and probably represent occasional migrants into the cave.

All of the species are found in or near the area today (see maps in Conant, 1958), indicating that no drastic climatic changes occurred during the occupancy of the cave.

## Fish

The notable paucity of fish remains indicates that this group of vertebrates constituted but a small part of the food of the cave inhabitants. Of a total of 211 pieces of bone, only 128, representing at least 12 species, could be identified. The scanty remains were scattered throughout all layers, Layer C having the largest number of specimens and species.

On the basis of the assemblage of fish species identified, it appears that these primitive people availed themselves of the Tennessee River rather than the smaller streams near the cave, for the complex of species identified is characteristic of a large river.

Although the bowfin (*Amia calva*), channel cat-

TABLE 24.—Fish from Russell Cave.

	Layers							
	G	F	E	D	C	B	A	Totals
Number of bones or fragments identified:								
<i>Amia calva</i> , Bowfin	0	1	0	0	3	0	0	4
<i>Lepisosteus</i> sp., Gar	1	0	0	0	0	0	0	1
<i>Lepisosteus osseus</i> , Longnose Gar	0	0	0	0	2	1	0	3
<i>Esox</i> sp., Pike	0	0	0	0	1	0	0	1
<i>Catastomidae</i> indet., Sucker	0	0	5	0	14	2	0	21
<i>Ictalurus</i> sp., Buffalofish	2	2	0	0	0	0	0	4
<i>Moxostoma</i> sp., Redhorse	0	0	0	0	9	1	0	10
<i>Ictaluridae</i> indet., Catfish	0	0	0	9	5	1	2	17
<i>Ictalurus</i> sp., Catfish	0	1	1	1	12	0	1	16
<i>Ictalurus punctatus</i> , Channel Cat	0	0	0	0	1	0	0	1
<i>Ictalurus furcatus</i> , Blue Cat	0	1	0	0	0	0	0	1
<i>Pylodictus olivaris</i> , Catfish	0	0	0	3	0	0	1	4
<i>Percida</i> indet., Perch	0	0	0	0	1	0	0	1
<i>Centrarchidae</i> indet., Bass	0	0	0	0	0	3	0	3
<i>Micropterus</i> sp., Bass	0	0	0	1	1	1	0	3
<i>Micropterus</i> cf. <i>M. salmoides</i> , Largemouth Bass	0	0	1	0	0	0	0	1
<i>Aplodinotus grunniens</i> , Drum	4	6	0	3	20	3	1	37
Number of individuals represented (minimal):								
<i>Amia calva</i> , Bowfin	0	1	0	0	3	0	0	4
<i>Lepisosteus</i> sp., Gar	1	0	0	0	0	0	0	1
<i>Lepisosteus osseus</i> , Longnose Gar	0	0	0	0	1	1	0	2
<i>Esox</i> sp., Pike	0	0	0	0	1	0	0	1
<i>Catastomidae</i> indet., Sucker	0	0	1	0	1	1	0	3
<i>Ictalurus</i> sp., Buffalofish	1	1	0	0	0	0	0	2
<i>Moxostoma</i> sp., Redhorse	0	0	0	0	3	1	0	4
<i>Ictaluridae</i> indet., Catfish	0	0	0	2	3	1	1	7
<i>Ictalurus</i> sp., Catfish	0	1	1	1	2	0	1	6
<i>Ictalurus punctatus</i> , Channel Cat	0	0	0	0	1	0	0	1
<i>Ictalurus furcatus</i> , Blue Cat	0	1	0	0	0	0	0	1
<i>Pylodictus olivaris</i> , Catfish	0	0	0	1	0	0	1	2
<i>Percida</i> indet., Perch	0	0	0	0	1	0	0	1
<i>Centrarchidae</i> indet., Bass	0	0	0	0	0	1	0	1
<i>Micropterus</i> sp., Bass	0	0	0	1	1	1	0	3
<i>Micropterus</i> cf. <i>M. salmoides</i> , Largemouth Bass	0	0	1	0	0	0	0	1
<i>Aplodinotus grunniens</i> , Drum	3	4	0	2	6	3	1	19

fish (*Ictalurus punctatus*), and freshwater drum (*Aplodinotus grunniens*) occur in small streams, the size of the Russell Cave specimens indicates that they must have been taken from a larger body of water, such as the Tennessee River. This is also true of the gar (*Lepisosteus*) and pike (*Esox*). The estimated size of the bowfin ranged from 12 to 24 inches, the channel catfish from 18 to 30 inches, and the freshwater drum from 18 to 36 inches. With the exception of the buffalofish (*Ictalurus*), all of the species listed in table 24 can be caught by the hook-and-line method. The freshwater drum and the various catfishes are the most common species throughout all layers, probably a consequence of availability rather than a dietary preference of early man. The catfishes are abundant in all bodies of water.

### Summary

Sixty-six species of vertebrates are represented among approximately 30,000 bone fragments recov-

ered from Russell Cave. Deer, turkey, racoon, squirrel, and bear comprised the major portion of the vertebrate diet. A number of other species present were probably not used by the cave inhabitants.

With the exception of the recently extinct passenger pigeon, an extinct peccary, and the porcupine, which now ranges several hundred miles to the north, all of the vertebrates occur as residents or migrants in the area. This assemblage of vertebrate species suggests that early man hunted in the area near the cave and availed himself of the Tennessee River and bottomlands. There is nothing to indicate drastic ecological or climatic changes during the period of cave occupancy.

The occurrence of an extinct Pleistocene peccary, *Mylohyus* cf. *M. nasutus*, in the lowest occupational levels is noteworthy. Its presence here further substantiates widespread evidence that some Pleistocene mammals survived until Post-Pleistocene times and were coeval with early man in America.

## PART 6: MOLLUSCA FROM RUSSELL CAVE

William J. Clench

It is evident from the rich assortment of freshwater mollusk shells recovered from Russell Cave that these animals were an important food source throughout the occupancy of the cave (fig. 58). On the other hand, the land snails present in all layers offer little evidence that they were used for food. Many were broken, but the occurrence of many small unbroken shells suggests that the land snails may have been migrants into the cave or were washed in during periods of flooding. Proportionately, more land snails occurred in the lowest two layers, Layers G and F, of the Early Archaic period. This may be due to the length of time encompassed by this period, about 3,500 years, or more than one-third of the time in which the cave was occupied.

The freshwater mussels and snails are quite a different matter, as these were all brought into the cave, many from as far away as the Tennessee River, some 6 to 7 miles to the southeast.

In the 38 lots received for study, there were approximately 5,100 specimens selected at random from the various layers. Of these, there were 360 specimens of freshwater bivalves (table 25), 4,350 specimens of freshwater snails (table 26) and 390 specimens of land snails (table 27).

The diet on freshwater mollusca was probably quite seasonal, possibly only in mid-spring and again late in the summer during periods of dry weather when both the Tennessee River and its tributary streams were low and clear. During high water stages it would be nearly impossible to fish for the freshwater mussels in the Tennessee River and quite difficult to obtain the snails in the smaller streams.

Nearly all of the mussels came from the Tennessee River, and the snails came from both the river and the tributaries such as Widow Creek and Crownover Branch, which are both close to the cave. It is possible that the freshwater mussels, brought alive from the Tennessee River, were placed in Dry Creek and/or Crownover Spring and then eaten when needed. The large number of broken shells in the cave probably indicates that they were broken open

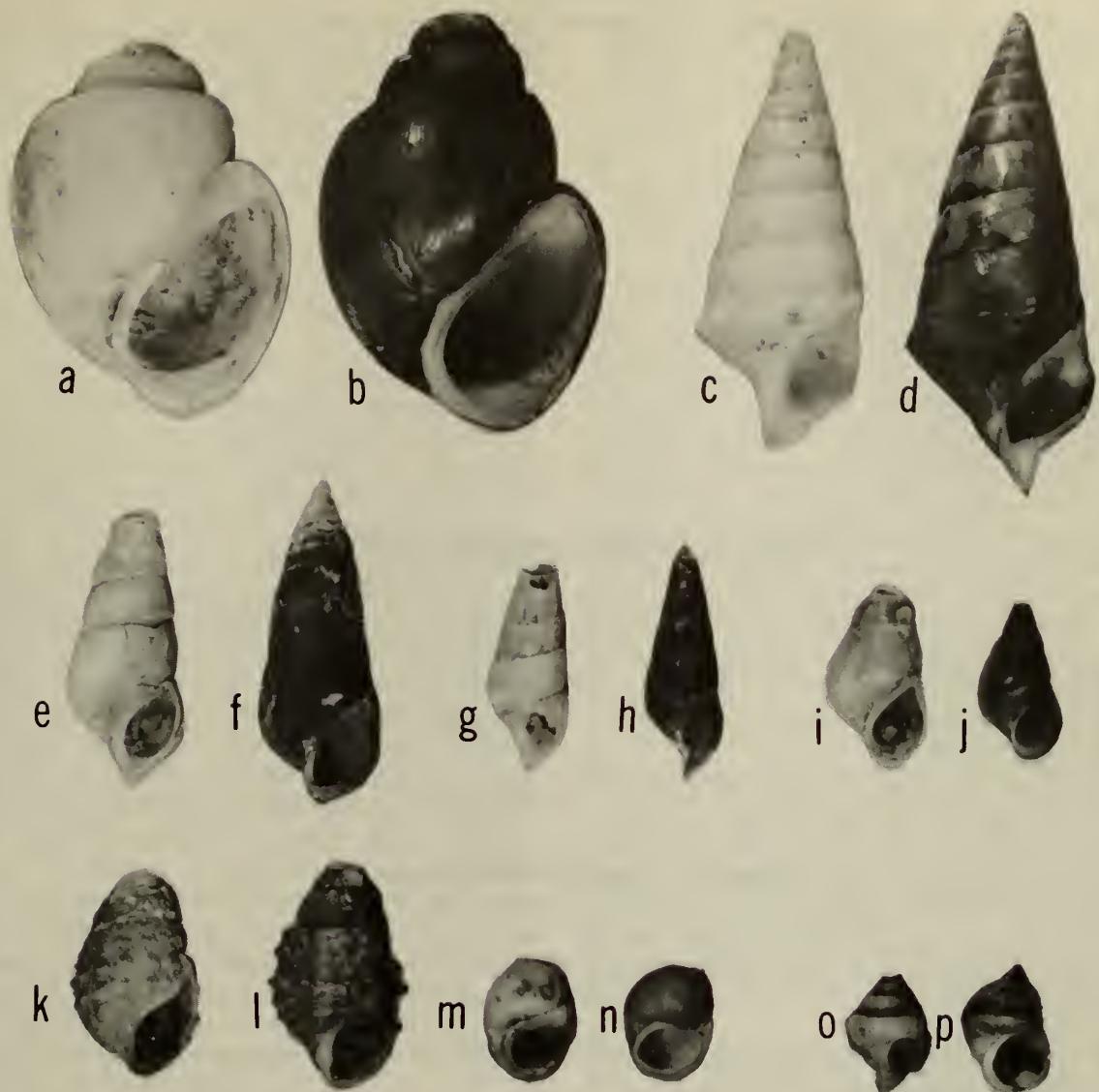
while still alive and not cooked first. They may even have been eaten raw.

It is of considerable interest that the river snail *Campeloma regularis* (Lea) and the large river mussels were not found in the earliest layer, Layer G. The few shell fragments obtained from this layer are of mussels which occur only in small creeks. The freshwater snails, such as *Goniobasis laqueata* (Say) and *G. angulata* (Anthony), are creek inhabiting, and the numerous specimens of *Pleurocera canaliculata* (Say) are the creek form and not the pustulose form which occurs in the Tennessee River. This may indicate that no attempt was made by the Early Archaic people to bring back from the Tennessee River any live mollusks for food. They either fed upon the mollusks while at the river or they did not range as far as the Tennessee in search of food.

River snails and mussels occurred in all layers above Layer G, though they were relatively infrequent in Layer F.

The periwinkles *Pleurocera canaliculata* and *Goniobasis laqueata* and *angulata* were by far the dominant mollusks. All had the tips of the spires broken off. This suggests that these snails were roasted or broiled, the tip broken against a stone and the soft parts sucked out through the shell aperture. The large river snails, *Campeloma regularis*, were roasted or boiled and the soft parts extracted from the aperture, possibly with a bone or wooden needle. The early whorls were not broken off. This different procedure may be due to the fact that *Campeloma* are ovoviparous and the young contained in the uterus have well developed shells. Thus a close examination of each extracted snail was necessary and the young, if present, expelled from the flesh of the adult before eaten. There is a much greater proportion of females to males in this species and they continually produce young throughout most of the warmer months.

Curiously enough, this same procedure of breaking the tips is used today by the natives of North Borneo, according to my associate, Barry Wilson,



**Figure 58.**—Examples of all species of freshwater snails found in Russell Cave, compared to species from the general area of northeast Alabama and east Tennessee (approximately natural size): a. *Campeloma regularis* (Lea), Russell Cave, Layer F; b. *Campeloma regularis* (Lea), Tennessee River, Jackson Co., Ala.; c. *Pleurocera canaliculata* (Say), Russell Cave, Layer E; d. *Pleurocera canaliculata* (Say), Tennessee River, Bridgeport, Ala.; e. *Pleurocera canaliculata* (Say), Russell Cave, Layer G; f. *Pleurocera canaliculata* (Say), Widow Creek, 4 miles south-southeast of Russell Cave; g. *Goniobasis Laqueata* (Say), Russell Cave, Layer F; h. *Goniobasis laqueata* (Say), Widow Creek, 2 miles south-southeast of Russell Cave; i. *Goniobasis angulata* (Anthony), Russell Cave, Layer D; j. *Goniobasis angulata* (Anthony), Widow Creek, 2 miles south-southeast of Russell Cave; k. *Lithasia verrucosa* (Rafinesque), Russell Cave, Layer D; l. *Lithasia verrucosa* (Rafinesque), Tennessee River, Bridgeport, Ala.; m. *Anculosa subglobosa* (Say), Russell Cave, Layer B; n. *Anculosa subglobosa* (Say), Tennessee River, 9 miles south of Knoxville, Tenn.; o. *Anculosa virgata* (Lea), Russell Cave, Layer B; p. *Anculosa virgata* (Lea), Tennessee River, Knoxville, Tenn.

TABLE 25.—Freshwater bivalvia, Russell Cave.

	Layers						
	G	F	E	D	C	B	A
<i>Strophitus undulatus</i> (Say)	X				X	X	X
<i>Elliptio dilatatus</i> (Rafinesque)		X	X	X	X	X	
<i>Elliptio crassidens</i> (Lamarck)					X	X	
<i>Quadrula cylindrica</i> (Say)				X	X		
<i>Pleurobema clava</i> (Lamarck)					X	X	X
<i>Pleurobema cordata</i> (Rafinesque)					X	X	X
<i>Cyclonaias tuberculata</i> (Rafinesque)			X		X	X	X
<i>Obliquaria reflexa</i> (Rafinesque)			X		X	X	
<i>Ptychobranchus subtentis</i> (Say)					X		
<i>Dromus dromus</i> (Lea)			X	X	X	X	
<i>Lampsilis ovata</i> (Say)		X	X	X	X	X	
<i>Actinonaias carinatus</i> (Barnes)			X		X	X	X
<i>Villosa nebulosa</i> (Conrad)	X	X					
<i>Carunculinia parva</i> (Lea)			X				
<i>Dysnomia triquetra</i> (Rafinesque)						X	
<i>Dysnomia haysiana</i> (Lea)					X		X
<i>Dysnomia arcaeformis</i> (Lea)					X		X
<i>Dysnomia lewisi</i> (Walker)					X		

TABLE 26.—Freshwater gastropoda, Russell Cave.

	Layers						
	G	F	E	D	C	B	A
<i>Campeloma regularis</i> (Lea)			X	X	X	X	X
<i>Pleurocera canaliculata</i> (Say)	X	X	X	X	X	X	X
<i>Goniobasis laqueata</i> (Say)	X	X	X	X	X	X	X
<i>Goniobasis angulata</i> (Anthony)			X	X	X	X	X
<i>Lithasia verrucosa</i> (Rafinesque)				X	X		
<i>Anculosa subglobosa</i> (Say)				X			X
<i>Anculosa virgata</i> (Lea)					X		X
<i>Pomatiopsis lapidaria</i> (Say)	X						

TABLE 27.—Land gastropoda, Russell Cave.

	Layers						
	G	F	E	D	C	B	A
<i>Stenotrema spinosum</i> (Lea)	X	X					X
<i>Stenotrema stenotrema</i> (Pfr.)	X	X					X
<i>Mesodon cлаusus</i> (Say)							
<i>Mesodon zaletus</i> (Binney)	X	X	X				X
<i>Mesodon elevatus</i> (Say)	X	X	X	X	X	X	X
<i>Mesodon perigraptus</i> (Pils.)	X	X	X	X	X	X	
<i>Mesodon rugeli</i> (Shuttleworth)	X	X	X				
<i>Triodopsis fraudulenta vulgata</i> (Pils.)	X						
<i>Triodopsis carolinensis</i> (Lea)	X	X					
<i>Triodopsis albolabris</i> (Say)	X	X	X	X			
<i>Allogona profunda</i> (Say)			X				
<i>Haplotrema concavum</i> (Say)	X	X	X				
<i>Mesomphix vulgata</i> Baker	X	X	X	X			X
<i>Anguispira alternata crassa</i> (Walker)	X	X	X	X	X	X	X
<i>Helicodiscus parallelus</i> (Say)	X						
<i>Discus patulus</i> (Deshayes)	X	X					

of the Western Australian Museum, in Perth, who was in North Borneo in early 1964. The mollusks in this case were marine species.

*Strophitus undulatus* (Say) and *Villosa nebulosa* (Conrad), as shown in table 25, are creek inhabiting and do not occur in the larger rivers, such as the Tennessee. Certainly many of the gaps which appear in this table would be filled if a greater area

of the cave deposits had been excavated. Their absence from any one layer does not mean that they were completely absent from that layer.

In table 26, the records for *Lithasia verrucosa*, *Anculosa subglobosa* and *A. virgata* are based on single specimens. These are all snails which live only on rocks or rocky ledges. This would indicate that visits to the area of Bridgeport, some 6 miles south-

east of Russell Cave, must have been relatively infrequent. Bridgeport is the lower limit of rocky shoals in this section of the Tennessee and rocky areas do not appear again until Muscle Shoals is reached, in the northwestern portion of the state. Much of this area is now destroyed by the Wilson Dam.

It would appear, at least based upon the mollusks in the cave, that probably the section of the Tennessee generally visited was near the mouth of Widow Creek.

In table 27, I list the species which occurred in the various layers. Their presence or absence in any one layer is, in general, an indication of their relative abundance in the immediate area of Russell Cave. Again, as stated for table 25, many of the gaps would be filled in if the entire cave deposits had been turned over. Nonetheless, the area covered by the excavations is large enough to be significant. As for the mollusks, more excavations would probably result only in a refinement of the data now available.

So far as the land and freshwater mollusks are concerned, no climatic change of any magnitude took place during the entire occupancy of Russell Cave. If any climatic changes did occur in northeastern Alabama during this time span, such changes were not great enough to modify the molluscan fauna. The species of mollusks living in Widow Creek and the Tennessee River today are the same as those that existed in the same situations nine thousand years ago. Even the land snails in the various layers are composed of the same species which are to be found in the immediate area of Russell Cave. With few exceptions all of the species concerned are wide ranging.

References dealing with the determination of the mollusks follow:

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WALKER, BRYANT, A Synopsis of the Classification of the Freshwater Mollusca of North America, North of Mexico, Mus. of Zool., Univ. of Michigan, Miscellaneous Publications, no. 6, pp. 1-213, 1918. Ann Arbor.

WALKER, BRYANT, The Terrestrial Shell-Bearing Mollusca of Alabama. Mus. of Zool., Univ. of Michigan, Miscellaneous Publications, no. 18, pp. 1-180, 1928. Ann Arbor.

I am indebted to my colleagues, Richard I. Johnson of the Museum of Comparative Zoology, for naming the freshwater mussels, and Herbert Athearn of Cleveland, Tennessee, who managed a short collecting trip to the creeks of the general area of Russell Cave during the spring dry period. This made possible a comparison of the Russell Cave material with recent specimens, particularly from Widow Creek, where presumably many of the cave shells were found. My thanks are due Mrs. Edmund U. Ritter and her daughter for the preliminary sorting and labeling of the large number of specimens comprising the collection from Russell Cave.

## Freshwater Gastropoda

### *Campeloma regularis* (Lea)

A species occurring in the Tennessee River in northern Alabama and in the Coosa-Alabama River System in central Alabama (fig. 58a, b). As far as we know, it does not occur in the small tributary streams, such as Widow Creek, near Russell Cave, or Crownover Branch, just a short distance to the east.

### *Lithasia verrucosa* (Rafinesque)

Only two specimens of *Lithasia verrucosa* (Raf.) and two specimens of *Anculosa subglobosa* (Say) were obtained throughout the seven layers in the material submitted for study (fig. 58k, l). This is most interesting as it would indicate that visitations to the Tennessee River, at the present town of Bridgeport, Alabama, were rarely made. This is the nearest area where the two species can be obtained. These two species do not live in the muddy areas but only on rocks, which do not occur below Bridgeport until near the area of Muscle Shoals.

### *Pleurocera canaliculata* (Say)

This species is widely distributed throughout most of the vast Ohio River system (fig. 58c-f). It is a polymorphic species with numerous forms existing in various types of environment, the smaller and

more attenuated forms appearing in the smaller streams. It was the most abundant mollusk in the cave.

#### *Goniobasis laqueata* (Say)

The second most abundant species in the cave occurs mainly in small rivers and creeks and is widely distributed in Kentucky, Tennessee, and northern Alabama (fig. 58g, h).

#### *Goniobasis angulata* (Anthony)

This species was rare in the material from Russell Cave (fig. 58i, j). Its occurrence only in Layers D, C, B, and A means little, as it may well occur elsewhere in the cave. Mr. Athearn found only a few specimens in Widow Creek, 2 miles south-southeast of Russell Cave. It is a species distributed in many of the creeks of Jackson County, Alabama, and Marion County, Tennessee.

#### *Anculosa subglobosa* (Say)

Only two specimens of this species were in the material studied, and one of these had been drilled (fig. 58m, n). This species lives on rocks and does not occur south of Bridgeport. It is wide ranging in the upper Tennessee system.

#### *Anculosa virgata* (Lea)

A single specimen of this species, from Layer B, was present in the collection (fig. 58o, p). This is a rock inhabiting snail and probably came from the vicinity of Bridgeport, its lowermost limit on the Tennessee River.

#### *Pomatiopsis lapidaria* (Say)

A single specimen of this species was obtained from Layer G. This specimen was worn and was perhaps brought into the cave by accident. It has no significance at all, as it is only 3 to 4 mm. in length. It lives along the muddy banks of creeks and rivers.

### Land Gastropoda

#### *Allogona profunda* (Say)

A rare land snail in Alabama, known only from Princeton and Stevenson, in Jackson County, the county in which Russell Cave lies. A single specimen was obtained in Layer E. This would seem to indicate that this species has always been rare in the area.

## PART 7: THE SITE IN RELATION TO SOUTHEASTERN ARCHEOLOGY

We are now prepared to see, insofar as we can, how Russell Cave fits into the developing picture of Southeastern archeology. This involves a comparison of the cave material with that from other sites in a space-time framework (fig. 59).

Ideally, this comparison should proceed from the definition of a series of cultural units which we could consider as components. Willey and Phillips (1958) stress that the component and the phase are the basic units of archeology and urge that primary emphasis be placed on the formulation of these units in local and regional contexts. And Spaulding (1960, pp. 61-62) states: "the ideal unit of archaeological study is the assemblage of artifacts produced and used by a single society over a period of time short enough to preclude any marked changes through cultural innovations or shifts in relative popularity of attributes or attribute combinations." Such an assemblage would define the artifact content of a component.

What has frequently been ignored, however, is the fact that the determination of such units is sometimes impossible because of the conditions of the site itself. Leroy Johnson's excellent discussion of the problem of component recognition, while dealing primarily with Texas archeology, could have been written with Russell Cave in mind:

It has been common for some local archeologists to assume that since a group of artifacts is present in the same geologic stratum or, worse, in the same arbitrary excavation level, they reflect a single occupation. But it is neither proof of the coevality of the artifacts nor of any close contextual relationship between them in a cultural sense. The presence of distinct natural strata in sites can be quite deceptive, for the artifacts contained therein are not necessarily in cultural association with one another. In many sites which were apparently occupied intermittently by small groups of people through many millennia it is to be expected that refuse deposited at any particular time will become mixed with debris from other occupations,

earlier, later, or both. If the occupying people have somewhat different artifact tool-kits, it is easy to see that a considerable variety in artifact form may end up in a single stratum or excavation level of a site. These artifacts do not represent one cultural unit (Johnson, 1967, pp. 6-7).

The general considerations mentioned by Johnson should be enough to warn us, but to these we can add the documentation which is emerging from the study of deep stratified sites with short-term occupations in several parts of the Southeast. Joffre Coe, over a period of many years, has concentrated on the discovery and excavation of deep stratified sites in the North Carolina Piedmont containing short-term occupations, frequently separated by sterile layers. He observes:

The work at these sites demonstrated two important facts: first, that stratified sites of depth and antiquity do exist in the alluvial flood plains of the Piedmont; and second, that when an occupation zone can be found that represents a relatively short period of time the usual hodge-podge of projectile point types are not found—only variations of one specific theme. In the light of this evidence, there can no longer be any doubt as to the diagnostic value of projectile points . . . (Coe, 1964, pp. 8-9).

Near St. Albans, West Virginia, Bettye Broyles (1966) has been working for several years on a deep site of the kind mentioned by Coe. Here, once again, the picture is one of short-term occupations, each characterized by a single projectile point type.

True single component sites, while relatively rare in the literature, also support this point of view. The scarcity of such pure sites is probably partially due to the fact that most locations would have been attractive over a period of time, resulting in repeated occupation and consequent mixture. Erosion, too, has doubtless played a part in mixing sites even further, resulting in the shallow mixed sites which

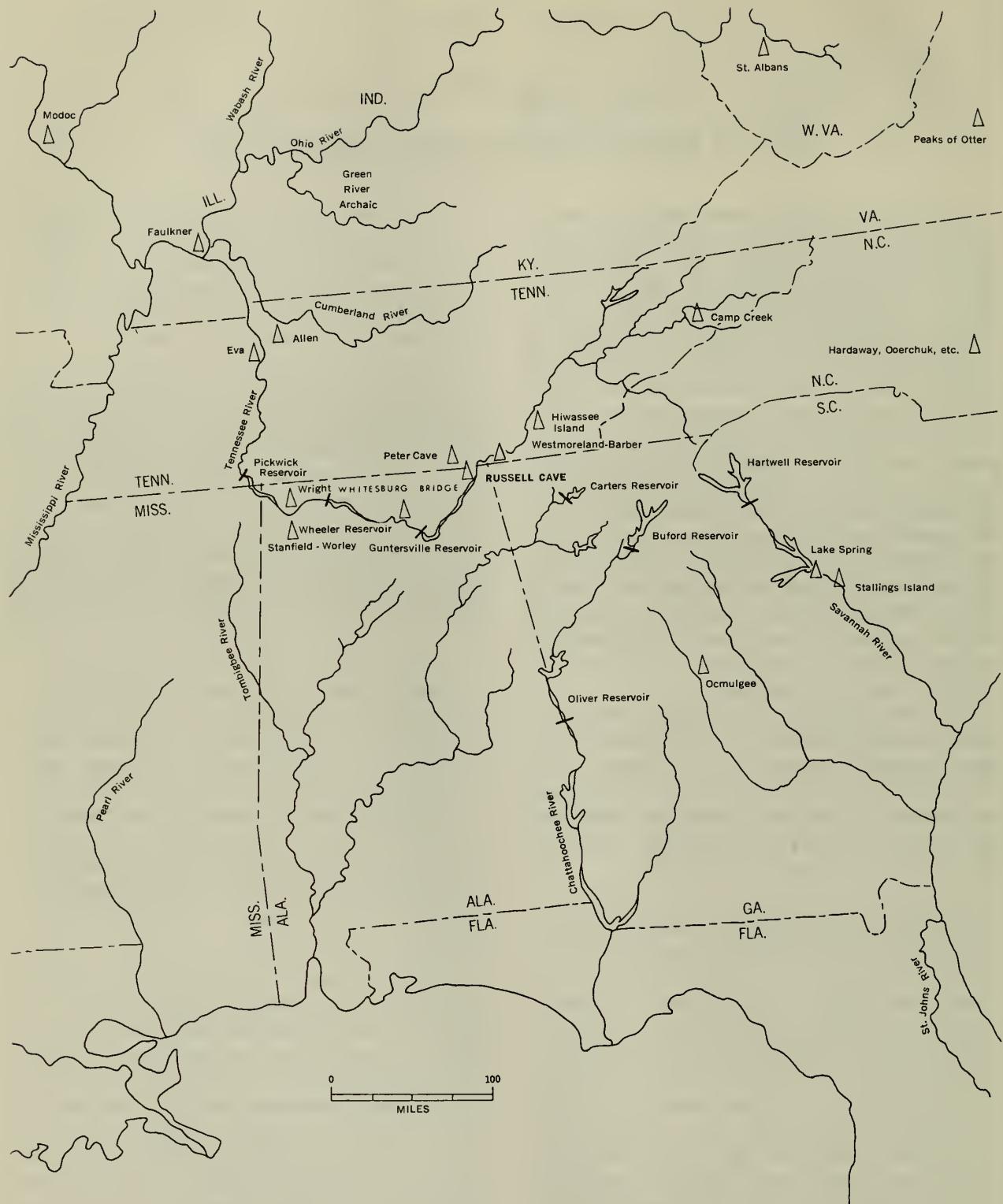


Figure 59.—Selected archeological sites and localities in north Alabama and parts of neighboring States.

are so frequent in the East. Also, a pure site of short duration (particularly an Archaic site) would tend to be small and relatively unproductive, and hence easily overlooked.

But some examples of pure or nearly pure sites do exist. Over two-thirds of the projectile points from the Allen Site in Stewart County, Tennessee, were of a single type, Kirk Serrated (Morse, Ms. a.). Hubbert (1961) has reported an Alabama site which yielded LeCroy points, with only a very few exceptions. Another site yielding only bifurcated base points similar to the LeCroy has been reported from West Virginia (Durrett, 1952). With increased recognition of the significance of this type of site more will certainly be reported.

Pits and caches within sites can also provide information on complexes that existed at a single point in time, although earlier materials can always find their way into the fill. Burials with associated grave goods are another good source of information and were used to define the Morrow Mountain complex as it exists in the Stanfield-Worley Bluff Shelter (DeJarnette, Kurjack, and Cambron, 1962).

Thus the evidence suggests that with more refined work—and considerable luck—more and more projectile point types may be isolated which, when they are defined closely enough in time, can become period markers.

Around these period markers, where associations can be validated, we can build the complexes of artifacts which will constitute the assemblages meeting the specifications of Spaulding's definition. To these can be added the traits other than artifacts which can be either observed or inferred to give as complete a description as possible of the culture. At this point, we can truly speak of components.

But there are at present relatively few such rigorously defined components in the Eastern Archaic. This will hamper our comparisons, for we will often have to compare the acknowledgedly mixed layers from Russell Cave with units in other sites which are presumably equally mixed. But even though these layers and other units inferentially contain materials from several components, they do fall into blocks of time which are sequential. Thus we can at least make some progress toward fitting the Russell Cave material into a general time framework.

There is another complication which we should examine. A local sequence, derived either from a single site or an interdigitated series of sites, is usually presented as a lineal, most frequently de-

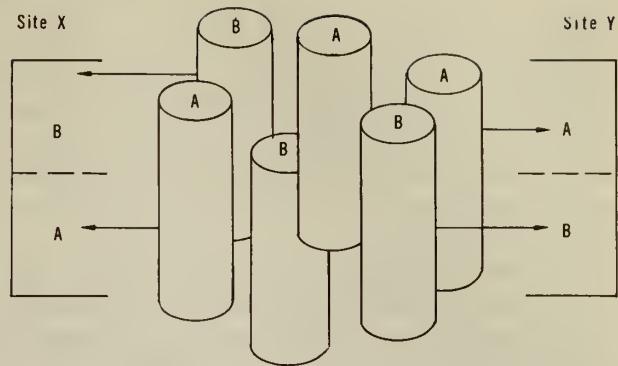


Figure 60.—A model for coexistent traditions.

velopmental, construct. Sometimes these are thought of as discrete, layer-cake units; at other times they are thought of as units abstracted from the continuum of a tradition. And sometimes the intrusion of a unit from outside the immediate area is seen in the temporal column, either as a short-term interruption of the local tradition, or as the truncation of a prior tradition and the substitution of a new one. Seldom has serious attention been given to the possible coexistence within a relatively restricted area of diverse traditions. Yet in at least one instance with which we shall deal, this latter situation seems a definite possibility.

To clarify our own thinking on this point, we have prepared a model of coexistent traditions (fig. 60). The cylinders represent interspersed social groups with definably different artifact assemblages. Each has some time depth in the geographical area under consideration, but the extent of this time depth is not given definite limits. The cylinders are shown as open-ended in time, and the model does not therefore indicate how or why they came to be in this geographical location, what they have developed from or what they develop into, or the degree of influencing or interinfluencing of one on the other. It merely shows a situation at a given block of time which can yield different sequential relationships between the two at different sites. These are shown in the stratigraphic site columns at either side of the diagram.

To make this work we have to make two assumptions about the cultures of Archaic times. We have to assume that distinct social groups can exist interspersed (this is really more than a side-by-side relationship) over at least a reasonably long period of time. And we have to assume that the sites in

question would be available to either of the groups at least part of the time.

The first of these assumptions probably requires that the two groups occupy at least somewhat different ecological niches. This does not seem unreasonable, although we must grant that in most instances not enough is known to define the presumed subsistence differences.

The second assumption probably requires that the groups are following a seasonal cycle, that the site in question is not continuously and permanently occupied, and that territoriality through time is not absolutely rigid.

Under these conditions, the circumstance of the model can probably be met.

The particular situation to which this model may be applicable will be discussed in the comparisons with Layer G, specifically in the relationships between LeCroy and Kirk points, but we believe that the general idea may have wider implications.

### Comparisons with Lower Layer G

The logical place to begin comparisons with the earliest Russell Cave material is the important Stanfield-Worley Bluff Shelter, which is about 120 miles west of the cave and about 7 miles south of the Tennessee River. To facilitate comparison, the named projectile point types from the lower zones as given in the site report have been pooled and are presented in table 28.

Zone D at Stanfield-Worley is now securely placed in time with a series of five radiocarbon determinations whose means cluster within a 720-year range, between 7690 and 6970 B.C. This clustering is clearly earlier than the determinations for the lower portion of Layer G at Russell Cave, and this is indicated in table 29 by placing Zone D earlier than the initial occupation of Russell Cave. Zone D is called the Dalton Zone by the investigators (DeJarnette, Kurjack, and Cambron, 1962), and it is in this zone that the maximum number of their Dalton points occurred. But it is immediately apparent from our table 28 that the Daltons are outnumbered by examples of Big Sandy I.

There is no evidence for a Dalton occupation as such at Russell Cave, but there were three specimens of Big Sandy I in the Lower G Layer. At Stanfield-Worley, this type is also the dominant one in Zones B and C, and it is on this basis that we roughly equate these two zones with Lower G (table 29).

TABLE 28.—Projectile points from lower zones, Stanfield-Worley Bluff Shelter (data derived from Tables 14, 18, 22 and 24, DeJarnette, Kurjack, and Cambron, 1962).

Type	Zones			Totals
	B	C	D	
Angostura		1		1
Beaver Lake			1	1
Benton			1	1
Big Sandy I	6	12	46	64
Big Sandy II	2		4	6
Dalton, Colbert	2	3	9	14
Dalton, Greenbrier		2	6	8
Dalton, Nuckolls		1	15	16
Elora Serrated			1	1
Flint River Spike	1			1
Gary	1			1
Greenbrier		1	3	4
Hardaway		1	3	4
Kirk Serrated	2			2
LeCroy			1	1
Lerma, Rounded Base			1	1
Stanfield			3	3
Swan Lake	1			1
Totals	15	22	93	130

A radiocarbon determination of  $3850 \pm 200$  B.C. (M-1349) was obtained for the top of Zone B; this, however, is about 2,000 years too recent for the interpretation given here.

This is not the place to discuss whether or not the presence of Dalton and Big Sandy I points in Zone D is a case of true association. This must be settled by work in sites earlier than Russell Cave. Excavation of eight bluff shelters on Sand Mountain, across the Tennessee River from Russell Cave (Clayton, 1965) did not settle this point, but it did add further information to the whole transitional and Archaic picture in this portion of the Southeast.

At any rate, the basally ground, side-notched Big Sandy I points are clearly among the earliest of our Archaic materials. Whether they will eventually be found in a "pure" context remains to be seen.

It should be noted that a certain amount of confusion is resulting from the separation of Big Sandy into two types. These are distinguished largely by the presence of basal grinding on Big Sandy I, and when this criterion is ignored the "type" ranges far more widely in time. The description in Bell (1960) is of what is now known as Big Sandy II. These points occur most commonly in the Three Mile component at the Eva Site, where Lewis and Lewis (1961, p. 37) remark, "Ground basal edges occur in some sites, but none of the examples from the Eva site showed this characteristic."

Winters (1963, pp. 20-21) notes that Big Sandy is identical in shape to the early Archaic Faulkner Side Notched of southern Illinois. His comparison

TABLE 29.—Proposed correlation of some Archaic manifestations in the Southeast.

Dates B.C.	Periods	Russell Cave	Stanfield-Worley (DeJarnette et al., 1962)	Eva (Lewis and Lewis, 1961)	North Carolina Sequence (Coe, 1964)	St. Albans (Broyles, 1966)
	Early Woodland	Layer D				
1000				Big Sandy Phase		
2000	Late Archaic	Layer E			Savannah River	
3000			Zone A	Three Mile Phase		Halifax
4000	Middle Archaic	Layer F			Gullford	Morrow Mountain
5000				Eva Phase	Stanly	
6000	Early Archaic	Upper Layer G	Zones B and C		Kirk	Kanawha LeCroy
7000		Lower Layer G			Palmer	St. Albans Kirk Crn-Ntch.
8000	Transitional		Zone D (Dalton)		Hardaway	corner notched side notched

is to the Tennessee material of Lewis and Kneberg, which equates with Big Sandy II at the Eva Site. However, he mentions that 84 percent of the Faulkner points from his survey of the Wabash Valley show basal grinding, which would place them as equivalent to Big Sandy I in time.

Side-notched points at the Modoc Rockshelter in Illinois show some basal grinding (Fowler, 1959, p. 36), and at the 6000 B.C. level account for about 30 percent of the total points. This is not too far from the 20 percent of side-notched points from Lower Layer G at Russell Cave. However, after this time the two sites diverge markedly in the popularity of side-notched points. At Modoc, they continue to increase in popularity, reaching a peak of about 65 percent around 4000 B.C. (op. cit., p. 37), while at Russell Cave they decrease markedly above Lower Layer G (table 9).

Side-notched points are present in all levels of Graham Cave (Logan, 1952).

On this general time level is Coe's Palmer complex. A single specimen, questionably assigned to this type, came from Russell Cave. The Palmer is described by Coe (1964, p. 67) as a corner-notched

type, but some of the illustrated examples approach side-notching. Palmer shares basal grinding with the other Early Archaic types.

As previously indicated, the distinctive Russell Cave point type can only be placed in the general time context of Lower Layer G. Examples from other Eastern sites have not been identified. However, there is a point from the lower portion of Bat Cave, New Mexico, which, judging only from the illustration, appears to be similar (Dick, 1965, Fig. 23g). This point must date earlier than 4000 B.C. since a radiocarbon determination of  $3981 \pm 310$  B.C. was obtained from a hearth in the top of the buff sand layer in which it was found (op. cit., p. 17).

Three LeCroy points were found in the lower portion of Layer G at Russell Cave. A single specimen of the type was found at Stanfield-Worley (DeJarnette, Kurjack, and Cambron, 1962, Table 18). This came from Zone C, which we equate in time with Lower Layer G. Two examples came from the Eva Site, one from the Three Mile "component," and the other from the earlier Eva "component." On the basis of comparison with the Flint Creek

Rock Shelter in Alabama, where four LeCroys were found in Stratum II along with Kirk and other Early Archaic points (Cambron and Waters, 1961). Lewis and Lewis (1961, p. 43) assign their specimens to the time of the Eva component, the earlier portion of which overlaps with the Lower Layer G at Russell Cave.

At the Westmoreland-Barber Site, slightly upstream from Russell Cave in Tennessee, two LeCroy points were found in a level below, and separated by a sterile band from, a level containing a Kirk Serrated point (Faulkner and Graham, 1966, pp. 68-69). Because of the St. Albans site sequence, to be discussed below, Faulkner and Graham were inclined to believe that their Kirk point had somehow been displaced upward. However, the stratigraphic relation is exactly like that in Russell Cave.

Lewis and Lewis describe their LeCroys as being a larger variant of the "classic, small LeCroy point." The specimens from Russell Cave and the Westmoreland-Barber Site, and also the illustrated example in the Alabama Handbook (Cambron and Hulse, 1964), are also of this larger variant. Perhaps they should not even be called LeCroy, but that is the way they are presently classified.

It is appropriate at this time to discuss the St. Albans Site in West Virginia (Broyles, 1966). The lowest zones of immediate concern (Zones 16, 18, and 20) are characterized by Kirk Corner Notched points, and one has a radiocarbon determination of  $6980 \pm 160$  B.C. Above this are two or more zones containing St. Albans Side Notched points ( $6870 \pm 500$  B.C. and  $6880 \pm 700$  B.C.). These are indented-base points, in outline somewhat similar to the LeCroys discussed above, but smaller. Next are two zones containing LeCroy points of the small, classic variety, with a radiocarbon determination of  $6300 \pm 100$  B.C.

The first thing to be noted is that the LeCroys mentioned earlier from Alabama and Tennessee cannot be fitted into either the St. Albans or LeCroy types as defined by Broyles at the St. Albans Site. While they are all clearly part of a bifurcated base tradition, and fall within the same millennium of time, they need not be absolutely contemporaneous.

The second fact is that Kirk Corner Notched points lie below the bifurcated types at St. Albans. One Kirk Stemmed point was found with a Kirk Corner Notched point, but two others were found in the Kanawha zones following the LeCroy zones in time (Broyles, 1966, p. 19). At Russell Cave, one

Kirk Corner Notched point and two Kirk Serrated points occurred with the LeCroy points in Lower Layer G, but the bulk of the Kirk Serrated points were in Upper Layer G. Kirk Corner Notched points were also found at Sheep Rock Shelter in Pennsylvania, in a stratum dated between 7000 and 5000 B.C. (Michels, 1968, p. 69). The evidence supports Coe's (1964, p. 70) conclusions. He defined three types, Kirk Corner Notched, Kirk Stemmed, and Kirk Serrated, but his classification has not been completely followed by others. He concluded that, "Although these three types may have overlapped during this period, there is evidence to show that the Kirk Corner Notched type appeared first and was most numerous in the lower level, while the Kirk Serrated type was most plentiful in the upper level."

The Kirk types and the various bifurcated-base types clearly belong to two separate traditions with no developmental relationship being involved. Hence, under some variation of the ideas expressed in our model of coexistent traditions, there is no reason why the stratigraphic relations at both Russell Cave and St. Albans do not reflect a true state of affairs.

Not too many years ago Fitting (1964) suggested dividing bifurcated points into two types, a larger and a smaller. Of these, based largely on the radiocarbon determination from the Eva Site, he believed the larger to be the earlier, with an age in excess of 5,000 years. The smaller points he was inclined to view as Late Archaic to Early Woodland, a placement which the St. Albans data clearly rules out. It now seems likely that the entire range of bifurcated-base points in the East is between 7000 and 6000 B.C.

The only evidence which seems at first glance to contradict this is from the Rohr rock shelter in West Virginia (Dragoo, 1959). Here, small bifurcated points were found in the lowest levels from which a radiocarbon determination of  $3360 \pm 90$  B.C. was obtained. However, there is a variety of point types from these lower levels, all of which cannot be associated with this date. We suspect that the bifurcated points are considerably earlier than the radiocarbon determination.

At the Peaks of Otter site in Virginia, bifurcated-base points (one a small LeCroy) were found associated with the lowest hearth excavated. This hearth was distinctly earlier than one for which a radiocarbon determination of  $3430 \pm 140$  B.C. was obtained (Griffin and Reeves, 1968).

Some years ago Lister (1953) suggested that bifurcated stemmed points might serve as a horizon marker, which, however, he could only narrow to a period between Folsom and recent. Far Western examples are Pinto points, and varying opinion still seems to assign them to a range of time nearly equivalent to the entire Eastern Archaic. Given the bias presented in this report, we cannot believe that the bifurcated Pinto points actually range through such a long period of time. But the solution to this problem must come from specialists working in the Western areas, where Bennyhoff (1958, p. 103) sees an urgent need for "a reappraisal of the entire Pinto problem in its various manifestations."

A number of stratified sites in the Northern Plains have yielded small stemmed points with notched base identified as Duncan and Hanna points and dated provisionally by associated charcoal between ca. 1500 B.C. and ca. 850 B.C. (Wheeler, 1954a, 1954b).

The eastern bifurcated points have been compared to the Pedernales and Montell points of the Texas area, but they are not similar in any strict sense. Although Pedernales points may date as early as 4000 B.C. (Bell, 1958), they are apparently not on the same time level as the Eastern examples discussed above. Recently, another bifurcated type, Gower, has been defined in Texas (Shafer, 1963). This type bears a closer resemblance to the Eastern points, and has been found stratigraphically below Pedernales. Crawford (1965) reports Gower points from a surface site which also produced other Archaic-looking points and a large group of points with Paleo-Indian affinities. Perhaps the Gower point is the Texas temporal equivalent of the LeCroy and other Eastern bifurcated points.

## Comparisons with Upper Layer G

In table 29, Upper Layer G is correlated with other sites and areas. Kirk Serrated accounts for over 27 percent of the points in this portion of the layer. If only the name types are considered, the percentage of Kirk Serrated rises to over 46 percent. We feel justified in regarding Upper Layer G as a dominantly Kirk occupation.

At Stanfield-Worley, Kirk points are not as proportionately numerous as at Russell Cave, but those present tend to concentrate in Zone B and the lower one-third of Zone A. Zone A at Stanfield-Worley is a highly mixed stratum containing everything from

Early Archaic through Mississippian. Pottery is found throughout most of the deposit, and the nature of the stratum was such that it did not lend itself to fine delineations. However, when Tables 14, 18, 22, and 24 in the report (DeJarnette, Kurjack, and Cambron, 1962) are scanned, it is apparent that there is some suggestion of stratigraphy in some of the projectile point types. In addition to Kirk Serrated, the lower one-third of Zone A is the provenience of most of the examples of Eva, White Springs, Morrow Mountain, and the single example of Stanly. Of these, all except Morrow Mountain are present only in Upper Layer G at Russell Cave. We therefore correlate the lower one-third of Zone A with Upper Layer G and at least partially with Layer F.

Based on the occurrence of projectile point types, the Eva "component" at the Eva Site may be correlated with Upper Layer G, but with overlaps in both directions to include part of Lower Layer G and part of Layer F. Specifically, the Eva "component" is the provenience of Kirk Serrated and LeCroy, which has been discussed previously. Also present is Cypress Creek I, a type not identified at Russell Cave.

The tabulation of point frequencies at the Eva Site (Lewis and Lewis, 1961, p. 30) suggests that Eva I is somewhat later in maximum frequency than Kirk Serrated at that site. Kirk Serrated points, however, are relatively scarce at Eva; over 80 percent of the points in the Eva "component" are of the Eva I type. The single Eva point at Russell Cave could not be placed in relation to other types in the same layer.

This placement of Kirk Serrated as between 6000 and 5000 B.C. agrees with its suggested date in the Carolina Piedmont (Coe, 1964, p. 121). We have previously discussed the earlier date for the Kirk Corner Notched type in the St. Albans Site, and the explanation of its stratigraphic position in relation to LeCroy at St. Albans and Russell Cave.

Two Stanly points were in this portion of Layer G, where they could not be stratigraphically separated from the Kirk points. In North Carolina, however, Stanly follows Kirk rather closely in time (Coe, 1964).

The Crawford Creek point is an enigma. It is present at Russell Cave from the Upper Layer G through Layer E. At Stanfield-Worley, this type tends to concentrate in the middle portion of Zone A, suggesting a somewhat later date than Upper G.

But the mixed nature of Zone A at Stanfield-Worley must be borne in mind.

The Kirk Serrated point gives every indication of developing into a good period marker in parts of the Southeast. Related types outside the Southeast do not seem too common, but the Datil point from Bat Cave (Dick, 1965, p. 28) appears to resemble Kirk Serrated. Dick notes (*op. cit.*, p. 29) that the Datil point is also found in an unnamed culture in southeastern Chihuahua, Mexico.

### Comparisons with Layer F

The projectile point collection from Layer F is rather non-distinctive except for the concentration of various Morrow Mountain types. In the field we tended to think of this as a Morrow Mountain layer, although it must be stressed that the identified Morrow Mountain points account for less than 8 percent of the points from the layer.

We have previously seen that Morrow Mountain at Stanfield-Worley tends to concentrate in the lower one-third of Zone A, where it occurs with earlier as well as later types. However, the discovery of three burials accompanied by 16 Morrow Mountain points and other artifacts makes it possible to speak of a Morrow Mountain complex at that site. The graves were dug from a point either in or above Zone B (DeJarnette, Kurjack, and Cambron, 1962, p. 80). We suspect that they originated in the lower part of Zone A.

None of the five burials in Russell Cave ascribed to Layer F was accompanied by grave offerings, in contrast to the three Morrow Mountain burials in the Stanfield-Worley Bluff Shelter. This suggests that they were not interments of people sharing the Morrow Mountain culture. This inference is strengthened by the fact that Burial 4 had been partially destroyed by a pit containing Morrow Mountain materials.

Layer F may be correlated with the top of the Eva "component" and the bottom of the Three Mile "component" at the Eva Site (table 29). Morrow Mountain is heavily concentrated in the Three Mile "component" at the Eva Site.

Morrow Mountain in North Carolina is estimated to fall in the period between 5000 and 4000 B.C., but is not believed to have occurred much before 4500 B.C. (Coe, 1964, p. 123). The dating of Layer F in Russell Cave is in agreement with this estimate.

At the Lake Springs Site on the Savannah River,

Caldwell (1954) isolated a stratum underlying Late Archaic which contained small ovate quartz points which are Morrow Mountain in shape. This was the basis for his Old Quartz Industry. The discovery of other sites in Piedmont Georgia and western South Carolina not only extended the geographical range of the industry but added other projectile point types, such as side-notched beveled points (Caldwell, 1958, pp. 8-10). The unifying factor is the use of a particular material, and Caldwell suggests that it may be possible to work out chronological subdivisions within the Old Quartz. The Westo Bluff Site, about 9 miles downstream from the Lake Springs Site, has yielded far more straight and expanded stem points than those of Morrow Mountain shape (Neill, 1966), suggesting that several diverse types with probable temporal implications are included in the Old Quartz Industry as presently known.

In the Carter Dam area, Georgia, A. R. Kelly found small round-base quartz points of Morrow Mountain type in a buried occupation layer (Kelly et al, Ms.). Charcoal from this horizon has been dated at  $6430 \pm 300$  B.C., which is considerably earlier than other dates for Morrow Mountain points.

Coe (1964, p. 122) has noted the striking resemblance between Morrow Mountain and Gypsum Cave points. It is possible that they are related; however, Gypsum Cave points are thought to be at least 1,500 years earlier than Morrow Mountain points.

### Comparisons with Layer E

Layer E is Late Archaic, and correlates with a part of Zone A at Stanfield-Worley and part of the Three Mile and all of the Big Sandy "components" at the Eva Site. It equates in time with much of the Green River Archaic in Kentucky and the Stallings Island or Savannah River Archaic of the coastal plain and Piedmont of the Southeast. With so much comparative material available from these manifestations, as well as from the shell-heap Archaic of the nearby Tennessee River in the Guntersville and Pickwick Basins, we should be able to say quite a bit about Layer E. Actually, we can say relatively little.

Trait-list comparisons with these other manifestations are so deceptive as to be misleading. A few trial Z-coefficient values were calculated and com-

pared with those given by Lewis and Kneberg (1959) and the results were discouraging. This is due to several factors: the location and type of site, the absence of burial traits in Layer E, and the general poverty of the artifact inventory at our site. The low correlations may be due also to the fact that Russell Cave represents a different portion of the seasonal cycle than that exhibited in the open sites.

Despite this, the temporal equivalence of Layer E with a number of the Late Archaic "components" is obvious. A cultural relationship is obvious, too, although it rests primarily on relatively subjective criteria.

Less than one-fourth of the projectile points could be placed in named types, but many of these are at home in a Late Archaic context. Both Ledbetter and Benton points occur in the Big Sandy "component" at Eva. Benton is concentrated in the upper two-thirds of Zone A at the Stanfield-Worley site, while Pickwick, the most numerous single type in Layer E, is found in the upper one-third of Zone A.

But the overall impression of the collection of points from Layer E is, to anyone who has worked in the area, overwhelmingly indicative of Late Archaic. Over 85 percent of the points are stemmed or expanded stem. Many long narrow points are present, and overall size is greater than in the deposits on either side of Layer E.

### Résumé of Archaic Comparisons

The preceding sections have discussed the alignment of the Archaic layers in Russell Cave with a limited number of sites and sequences. We have relied heavily for comparison on specific projectile point types found in our various layers and have found that a good case can be made for many of them occurring at approximately the same time in zones, levels, components, or complexes at other sites. In every instance, we spoke of the point types as isolated traits rather than as part of an assemblage. This was deliberate because we believe that, except in cases where a level contains only one type, there is as good a chance of mixture, as in our layers.

The work of Coe (1964) has previously established that certain point types can be taken as markers for some sort of cultural units. Among these may be mentioned the Palmer, Kirk, Stanly, and Morrow Mountain types. We suspect that the high

percentage of Eva I points in the Eva "component" may indicate that this type may be another such marker. And we also suspect that, for at least a part of its time range, the Big Sandy I type is independent of Dalton. LeCroy, including St. Albans, is certainly another such instance. We believe that as more sites are worked and more analyses are carried out the number of these markers will increase.

Obviously, a projectile point type does not constitute a culture. It may well be that assemblages associated with particular point types of roughly the same time period will show little or no difference from one another; that, so far as the archeologist can see, they are representatives of the same cultural entity, differing only in this one respect. But we will not know this until the assemblages are built around the point types, and until all aspects of the seasonal cycle are defined as well.

It is becoming increasingly apparent that members of Archaic groups did not produce any and all kinds of points. A point is the product of conditioned behavior, and as such it is meaningful in the socio-cultural milieu of the maker. Do different point types occurring in a given area at about the same time but not obviously related in a developmental way imply coexistent social groups that exploited different ecological niches? This is a possibility.

### Comparisons with Layer D

With Layer D we reach the levels in Russell Cave in which pottery begins to be found. This signals not only a major culture change in the site but also the point at which comparisons take on a different orientation. Henceforth, comparisons will be with a geographically more restricted area, and potsherds rather than projectile points assume the primary role as culture indicators.

Long Branch Fabric Marked, a well-known limestone-tempered Early Woodland type, is the prime marker for Layer D. But before discussing it, two other wares, fiber-tempered and sand-tempered, which are all but absent at Russell Cave, must be mentioned.

The generalized ceramic sequence in the Tennessee Valley consists of five wares, defined by tempering, which are temporally aligned as follows: fiber-tempered, sand-tempered, limestone-tempered, clay-grit tempered, and shell-tempered. This se-

quence is reported by Heimlich (1952) in the Guntersville Basin.

With the exception of portions of the Tennessee Valley, fiber-tempered pottery in the Southeast is confined largely to the Coastal Plain. Ten radiocarbon determinations from seven sites in Georgia and Florida are now available for dating the fiber-tempered pottery of that region (Bullen, 1961). By about 2000 B.C., plain fiber-tempered pottery was being made in both Georgia and Florida, and by about 1500 B.C., decoration had been added and two complexes, Stallings in Georgia and Orange in Florida, had become differentiated. Fiber-tempered pottery continued to be made until about 1000 B.C. on the Georgia coast, and perhaps somewhat later in Florida.

The Stallings series centers on the Georgia coast and does not extend much to the north. In Georgia, it penetrates the larger rivers to the Fall Line or only a little beyond. The Orange series covers most of peninsular Florida, with the exception of the extreme southern tip. In northwest Florida and along the central Gulf Coast, Phelps (1965) has recently defined the Norwood series. This series apparently does not penetrate far up the Chattahoochee, however, and Stallings-like sherds were found in the Oliver Basin just above the Fall Line (McMichael and Kellar, 1960). Along the Gulf coast, a few plain fiber-tempered sherds were found in the lower portions of the Bayou La Batre shell midden (Wimberly, 1960, pp. 62-64).

The other major center of fiber-tempered pottery in the Southeast is on the Tennessee River. The Wheeler series is the earliest pottery present in many shell middens of the Wheeler and Pickwick Basins. It is known to extend northward along the Tennessee River into sites now covered by Kentucky Lake. It is but sparsely represented in the Guntersville Basin, where only 22 sherds were noted in the sample of over a quarter of a million analyzed by Heimlich (1952).

It has long been the opinion of Southeastern archeologists that these various fiber-tempered series were related and probably roughly coeval. It may safely be regarded as the earliest pottery in the United States, particularly now that the formerly enigmatic date for Vinette I pottery has been revised (Ritchie, 1962). Bullen (1963) postulated an independent origin for fiber-tempering in the Southeast, but recent discoveries in Middle and South America

reopen the question of influence from that direction (Ford, 1966).

It would seem to be no accident that the concentration of fiber-tempered pottery along the Tennessee River is in just that portion which is approached most closely by the coastal plain area below the Fall Line. Here, influences coming up the Tombigbee River drainage could most easily enter the area.

Whether the Wheeler series, which has not been dated by radiocarbon analysis, begins as early as the other fiber-tempered pottery is unknown. It must, however, have a considerable antiquity and should be much older than the Long Branch Fabric Marked of Layer D.

Seemingly, fiber-tempering entered the Tennessee Valley at or near Pickwick Basin and did not spread greatly in either direction. We have previously mentioned its scarcity in the Guntersville Basin. A single sherd was found at the Westmoreland-Barber Site in nearby Tennessee (Faulkner and Graham, 1966, p. 51). Its absence, except for a single small fragment, at Russell Cave is not surprising. At that time Russell Cave was culturally still in the Late Archaic.

A sand-tempered ware follows fiber-tempering in the Tennessee Valley but does not occur in any great quantity in the ceramic studies which have been published. For the Guntersville Basin, Heimlich (1952, p. 58) tabulates only 875 in her very large collection. In the selected Wheeler Basin sample, Griffin (Webb, 1939, p. 157) notes only 375 sherds, or 10 percent of his total. In the Pickwick Basin, 954 of the 47,966 sherds are sand-tempered (Haag, 1942, pp. 525-526). Sand tempering was rare at the Westmoreland-Barber Site in the Nickajack Reservoir, only 25 sherds being found in two seasons (Faulkner and Graham, 1966, p. 50). Either the period during which this pottery was used was relatively short or it is not well represented in the riverine sites investigated. I incline toward the former interpretation.

Given the scarcity of sand-tempered sherds in the general area and the presence of a few of them in Russell Cave, we assume that no hiatus exists in the sequence. A period in which sand-tempered pottery was used is represented, but this pottery is so sparse and impossible to segregate stratigraphically that it is ignored in the analysis except for this notation.

The Long Branch Fabric Marked pottery, which dominates Layer D, belongs to the Middle Eastern Tradition of Caldwell (1958), whereas the stamped

pottery from this layer relates to the Southern Appalachian Tradition.

So at the very outset we are confronted, in the layer which gives the most convincing appearance of a uniform deposit, with a situation which seems to indicate some sort of mixture. Is this mechanical mixture of the refuse of two (or more) groups with different cultures, or is this a group manufacturing or using pottery of two different traditions simultaneously? Unfortunately, there is no direct evidence in the Russell Cave situation to provide an answer to this question.

Sites producing pure or nearly pure levels of Long Branch Fabric Marked do exist. A pit containing almost exclusively Long Branch Fabric Marked sherds was found in the University of Tennessee excavations at the Westmoreland-Barber Site, just a short distance north of the Alabama line on the Tennessee River. This pit yielded a radiocarbon determination of  $340 \pm 150$  B.C. (Faulkner and Graham, 1966, pp. 113-114). Farther up the river in Tennessee, 62 percent of the sherds at the Camp Creek Site are Long Branch Fabric Marked (Lewis and Kneberg, 1957, p. 7). This is a site total, and Kneberg (1961, p. 6), in speaking of the complex of which Camp Creek is a part, characterizes it as being marked by 67 to 99 percent Long Branch Fabric Marked.

Downstream from Russell Cave is the Whitesburg Bridge Site (Webb and DeJarnette, 1948b). Here, 86 percent of the total pottery sample is Long Branch Fabric Marked, and in Zone B of Block 3 this percentage rises to 98 percent.

None of the Guntersville Basin sites show percentages approaching this, but these are all site totals from multicomponent sites. The information from the Pickwick Basin is in the same form. But sites are known, both upstream and downstream from Russell Cave, which have virtually pure Long Branch Fabric Marked levels. The date from the Nickajack Reservoir suggests that some of these may be somewhat earlier than the Layer D occupation in Russell Cave. Camp Creek, which has the lowest percentage of the sites mentioned, has produced a radiocarbon date of A.D.  $10 \pm 200$ , which is close to our Layer D date of  $150 \pm 200$  B.C.

Sites with high percentages of Wright Check Stamped are rare. We must remember, of course, that the variant of this type as represented at Russell Cave is not stamped overall, and that a considerable correction should be made for this. We would esti-

mate that at least as many plain as stamped sherds would come from a broken vessel of this type.

At the Wright Village Site in the Pickwick Basin, 84 percent of the sherds are of two types, Wright Check Stamped (34 percent) and Mulberry Creek Plain (50 percent). Only 5 percent of the sherds are Long Branch Fabric Marked (Haag, 1942, pp. 525-526). Larsen (1959) reports a surface collection from Talladega County, Alabama, in which 25 percent of the sherds are Wright Check Stamped and 74 percent are Mulberry Creek Plain. These two examples suggest that a manifestation exists in which Long Branch Fabric Marked has little or no place.

Site 9 HL 64 in the Buford Reservoir in north Georgia provides another datum point (Fairbanks, 1954). At this site nearly 76 percent of the sherds are Cartersville Check Stamped, slightly over 4 percent are related stamped types, and about 19 percent are plain. The site contains a few sherds of Wright Check Stamped and Mulberry Creek Plain, leading Fairbanks (op. cit., p. 19) to consider the types as contemporaneous. A radiocarbon determination of  $150 \pm 140$  B.C. was secured, which is virtually identical to our date for Layer D and close to the date from the Camp Creek Site in Tennessee.

Fairbanks sees check stamping as a horizon style with a time interval later than Long Branch Fabric Marked and Dunlap Fabric Marked and earlier than Mossy Oak Simple Stamped and Bluff Creek Simple Stamped. He goes on to say (op. cit., p. 19) that, "In each locality the various specific *horizon styles* indicate rather definite *relatively equivalent* time intervals. Whether these *relatively equivalent* time intervals are absolutely equivalent depends on additional information."

In a broad sense, Fairbanks' conclusions still seem valid, but we apparently do have at least partial contemporaneity between the fabric-marked pottery of the Middle Eastern Tradition of Caldwell (1958) and the stamped Southern Appalachian Tradition of the same author. This, in part, reflects the geographical distribution of the two traditions. From the point of view of the portion of the Southeast which we are discussing, the fabric-marked pottery tends to have a more northerly distribution than the stamped pottery. Stamping does not penetrate Tennessee to any marked extent. On the other hand, fabric-marked pottery in north Georgia is definitely succeeded by stamped pottery. In northern Alabama

the situation is not too clear. The Long Branch Fabric Marked appears to be earlier than check stamping. But we cannot rule out, on the basis of our Russell Cave data, the possible contemporaneity of Wright Check Stamped and Long Branch Fabric Marked in Layer D.

If the two types are actually contemporaneous in Layer D, we do not believe that they were made by the same potters. They are just too different for this to have been the case.

Of course, we can always call into play the idea of the capture of women—the presumed makers of pottery—and their adherence to the traditional ways in which they grew up. But, for this process to continue for more than a generation or two, it would seem necessary to postulate the existence of groups of the two traditions in a side-by-side or interspersed pattern of occupation in the general area. And if this situation existed, there is always the possibility that during the several hundred years which we have assigned to Layer D there were actual interdigitated occupations of the groups bearing these separate traditions. The stratigraphic data are not refined enough to determine which of the several alternatives or combinations thereof actually occurred.

### Comparisons with Layer C

When we reach Layer C, the situation is somewhat clearer. The small percentage of Long Branch Fabric Marked is interpreted as the result of mixture from the layer below. The spreading of soil from Layer C pits would be enough to account for the observed presence of the type.

Virtually all of the pottery from this layer, other than the dominant Mulberry Creek Plain, is stamped. Various methods of analysis were tried in an effort to define the temporal relationships of Wright Check Stamped and the various complicated stamped motifs within the layer, but without success.

Accompanying the shift in pottery in this layer is the shift in projectile points. Jacks Reef Corner Notched appears in quantity, accounting for over 20 percent of the points.

Complicated stamped pottery, with all of the motifs which we recognized, is included in the type Pickwick Complicated Stamped, which is present in a number of the Guntersville Basin sites (Heimlich, 1952) but nowhere accounts for more than 1.5 percent of a site total. This may be compared to our figure of 4.1 percent. Yet this pottery seems

to define a middle portion of the time range of limestone-tempered pottery in this area.

The relationships of the complicated stamping are obviously to the east and south of the Tennessee Valley. In particular, the motifs resemble most closely ones from Georgia, but there the stamping is present on a far greater proportion of the sherds.

### Comparisons with Layer B

The ceramic types in our Layer B are essentially a continuation of those in Layer C. Wright Check Stamped diminishes, as do the complicated stamped motifs. Mulberry Creek Plain makes up over 88 percent of the total. Although the percentages are small, this is the layer in which most of the Flint River Brushed occurs.

Flint River Brushed is another type which is known to be a dominant type at other sites. It is generally regarded as late in the limestone-tempered sequence in the Guntersville Basin (Heimlich, 1952). An example of a time period in which the type was dominant is provided by Zone C at the Cox Site (Ja° 176) in the Guntersville Basin, and in the same county in which Russell Cave is located (Webb and Wilder, 1951, p. 232). In this zone, 91.8 percent of the 2,861 sherds are Flint River Brushed.

We are forced to the conclusion that at the time of the dominance of Flint River Brushed the site in Russell Cave was seldom used. This would be toward the very end of limestone-tempering in this portion of the Tennessee Valley and may well mark a time of increased agricultural activity and changes in the seasonal occupational pattern which Russell Cave had evidenced for so long. Shell-temping, marking the last of the prehistoric occupations, also reaches its peak in this layer. But it is also scarce, although we know that relatively large Mississippian sites are present in the valley proper, where ample agricultural lands were available. Obviously, these people made very little use of the cave; probably only an occasional hunting party stopped here.

The generalized Tennessee Valley sequence has a period marked by clay-grit tempered pottery of the McKelvey series between the limestone-tempered and the shell-tempered. But only one sherd of McKelvey Plain came from our excavations.

That the clay-grit series is a function of geography, as well as of time, is apparent when the percentages of limestone-tempering and clay-grit

tempering are compared in the three reported basins along the Tennessee River in Alabama:

	<i>Limestone-temper</i>	<i>Clay-grit temper</i>	<i>Total Counts</i>
Guntersville Basin	94.8	5.2	199,972
Wheeler Basin	28.4	71.6	2,939
Pickwick Basin	18.8	81.2	41,611

The virtual absence of clay-grit tempering from Russell Cave is therefore not surprising. Not only is it rare in the Guntersville Basin, but also it falls in a time period when, as we have already seen, the preceding Flint River Brushed and the succeeding shell-tempered pottery are uncommon in our site.

We would estimate that sometime about A.D. 1000 use of Russell Cave lessened considerably as the cultural emphasis switched to the bottomlands along the Tennessee River for the major part of the subsistence activities of the people. Following that time, Russell Cave was used as a temporary campsite rather than as a seasonal abode.

The distribution of pottery types in the Nickajack Reservoir, just across the State line in Tennessee, is not much different from that at Russell Cave

(Faulkner and Graham, 1965, 1966). But farther upstream, in the Hamilton component on Hiwassee Island, 69 percent of the sherds are cord marked (Lewis and Kneberg, 1946, p. 83), clearly representing a different cultural manifestation.

One site that should be mentioned is Peter Cave near Sherwood, Franklin County, Tennessee. While the site is about 10 miles northwest of Russell Cave, drainage from the area is by way of Lost Creek and Crow Creek, the latter of which enters the Tennessee River some 7 miles downstream from Widows Creek. The report by Hartney (1962) discloses a ceramic complex which is distinctly like that of Layer C. Three radiocarbon determinations are available for Peter Cave, assayed by the University of Washington:

U.W. 4 18 in. below surface  $1340 \pm 100$  B.P. or A.D. 610  
 U.W. 5 24 in. below surface  $1686 \pm 60$  B.P. or A.D. 264  
 U.W. 26 30 in. below surface  $1540 \pm 70$  B.P. or A.D. 410

These dates fit nicely with Layer C. Only the top 3 feet of this site had been tested at the time of the report. Lower levels may contain earlier materials.

## PART 8: PREHISTORIC LIFE IN RUSSELL CAVE

In previous sections of this volume, my colleagues and I have described the excavations in Russell Cave and the materials recovered from it, and I have discussed the relationships of the materials to those from other sites in a time-space framework. In this final section, I want to discuss the inferences to be drawn from the evidence concerning the kind and extent of activities carried out in the cave.

### Rate of Accumulation and Intensity of Occupation

Table 30 presents data which enable us to make a rough assessment of the rate of accumulation of the deposits and the intensity of occupation of Russell Cave. If we first turn our attention to the depth of the various layers and their average rate of accumulation in relation to the estimated duration in years (based upon the radiocarbon determinations), we note that in no instance does the accumulation rise even to two one-hundredths of an inch per year, and in most cases it is considerably less.

The figures are admittedly crude for Layers F and G because of the variation in the thickness of the zones (see fig. 6). However, even doubling the depth for Layer G would still place the figure below one two-hundredths of an inch per year. In these two layers most of the accumulation is presumed to derive from the flooding and ponding activities discussed earlier.

Layer E discloses the lowest rate of accumulation, fitting in very well with Dr. Hack's geological conclusions.

Deposition in Layers B and C was from a combination of roof dusting and organic accumulation incident to occupation. The low rate of accumulation per year would not seem to support the notion, which has sometimes been suggested, that the inhabitants brought in dirt to create clean living floors.

The major point brought out by this entire demonstration is that the average yearly accumulation in the cave was very slight. This factor relates

directly to the cautions we have introduced in our discussions concerning physical mixture in the layers and the difficulty in defining components or other cultural units.

The remaining columns in table 30 reflect measurements of the intensity of use. It should be pointed out that the layers are not strictly comparable in these tabulations. Fewer squares, and hence less horizontal living space, are represented in the layers containing pottery (B through D) than in the underlying Archaic layers. The figures for numbers of artifacts and potsherds per year are not corrected for this disparity of sampling area. To do so would raise the numbers of artifacts and potsherds per year for Layers B through D.

If, for the sake of discussion, we assume that only one-thirtieth of the cave deposit is represented in our sample, and if we multiply by that factor, as in the column headed "x30," we still see that the specimens present in Russell Cave average out to a very small number per year. This implies that the cave was not occupied every year, that the time spent annually was very short, or that the groups were indeed quite small, or any combination of the three.

The use of Russell Cave cannot be characterized as intensive. This little exercise has proved quite instructive to the archeologists, who had the field impression of a site "loaded" with material. I would urge others to develop more refined techniques for measuring this sort of data. I view our figures as suggestive but must stress that they are extremely crude and should not be used for direct comparison with other sites.

### Seasonality

The conclusion seems inescapable that throughout its history Russell Cave was occupied only lightly and intermittently. A seasonal pattern of movement was almost certainly followed by the various cultural groups, although the details of the annual cycle would have varied considerably in the

TABLE 30.—Rate of accumulation and intensity of occupation at Russell Cave.

Layer	Duration (years)	Average Thickness	Average Accumulation (per year)	Number of Artifacts	Artifacts Per Year		Number of Potsherds	Potsherds Per Year	
					Sample Area	x 30		Sample Area	x 30
B	600	9 in.	.015 in.	79	.132	3.96	2,202	3.67	110.1
C	700	12 in.	.017 in.	202	.288	8.64	2,728	3.70	111.0
D	600	9 in.	.015 in.	87	.128	3.84	1,168	1.95	58.5
E	3,000	12 in.	.004 in.	169	.057	1.71			
F	1,500	18 in.	.012 in.	169	.113	3.94			
G	2,000	18 in.	.009 in.	247	.123	3.69			

range from Early Archaic to Mississippian. It remains to ask at what season or seasons the cave was used.

There are a few indications from the vertebrate fauna pointing to the winter season. Some evidence from the deer bones suggests fall or winter hunting, and the passenger pigeon is interpreted as probably indicating a winter season. On the other hand, Dr. William Clench (this volume) believes that the shellfish would have been easiest to procure during periods of dry weather in mid-spring and late summer. He further suggests, however, that mussels and snails could have been brought to nearby Dry Creek and/or Crownover Springs and utilized when needed. The shells, therefore, need not argue too strongly against a late fall and winter occupation pattern.

In addition to the shelter that the cave provided, there are several other reasons to suspect that an area like Doran Cove would present attractive features for winter use. It is probable that deer were more concentrated in the cove in the winter. Hosley (1956, p. 216) notes that while the white-tailed deer in North Carolina do not "yard" as do more northern members of the species, they nevertheless "spent the winter in sheltered coves and hollows at low elevations." Turkeys tend to flock in the fall, and remain flocked over the winter (Bent, 1932). They will gather where there is good shelter, and Doran Cove should have provided this in addition to a rich supply of mast.

At the end of the winter season the deer and turkey would tend to become more dispersed at the same time that the broader valley lands and the river margins would have become more productive. At least until the end of Middle Archaic times there would have been another reason to leave Russell Cave in the late winter or early spring. The living area still lay below the level of possible floods, which, while they may not have occurred every year, were certainly frequent, as the accumulation of the layers attests.

While not ruling out the possibility of occasional use of the cave at other times of the year, I am strongly inclined to view Russell Cave as a place of winter occupancy.

### Subsistence

The faunal identification and analysis presented elsewhere in this volume provides us with some evidence on the subsistence of the inhabitants of Russell Cave. We must, however, recognize that there is a built-in bias in this information. Struever (1968a) has recently demonstrated that without the use of finer techniques, such as flotation, the sample will be sharply biased in favor of larger animals, and also in favor of hunting over natural plant-food collecting.

Generally speaking, hunters and gatherers rely more heavily on plant foods than they do on animals (Service, 1966; Lee and Devore, 1968). Even among the agricultural peoples of historic contact times in the eastern United States, wild plants were extensively used (Yarnell, 1964; Griffin, J. B., 1967). There is no reason to believe that the inhabitants of Russell Cave did not utilize the vegetable realm extensively, but we have little direct evidence, primarily because the fieldwork preceded the full awakening of interest in the subject. Future work at Russell Cave should include the gathering of such data as one of its primary aims.

Miller (1960) recovered a small charred basket containing charred *Chenopodium* seeds in his excavations at Russell Cave, but its exact provenience is not known. Miller attributes the find to "the Early Woodland horizon, about 5,000 years ago." This is internally inconsistent: if it is Early Woodland, it is not 5,000 years old, and vice versa.

There may be indirect evidence of gathering, beginning in Middle Archaic times, in the form of the pits found in the cave deposits. These may have been for storage. Their contents, at least in prehorticultural days, were probably nuts, acorns, and other

seeds. However, there is no reason that all plant-food storage had to be subterranean. Basketry, for example, was apparently known throughout the time of occupation, if Jennings (1968, pp. 116-118) is correct in interpreting the presence of awls as more likely representing basketry manufacture than leather-working.

Mortars, pestles, and nut-stones may be taken as further evidence of the use of plant foods.

Returning to the animal bones, we must also recognize that the quantity of bone refuse recovered is not necessarily an actual reflection of the amount originally there, even considering the excellent preservation existing in sites such as Russell Cave. Vereshchagin (1967, p. 381) remarks, "According to our observations in modern open camps of fishermen and hunters, with dogs, cats, and magpies, no more than 1 per cent of the cleaned bones remain or are trampled into the soil layers. In Paleolithic camps, leavings were pilfered by arctic foxes, rodents, and birds." This factor may or may not affect the proportions of different species to one another, but it certainly affects the total quantity of bone available for study, and hence casts serious doubts on studies which attempt to assess the total biomass represented in a site.

And, there is one further cautionary note concerning our use of the faunal sample at Russell Cave. The fauna is tabulated in the same series of layers as are the artifacts. We have already seen that several distinct cultural groups are represented in at least a majority of the layers. The bones are, therefore, subject to the same difficulties of unit definition as are the artifacts.

Table 31 summarizes the number of species of various faunal groups found in the different layers. Reference to the section on the fauna will disclose that a number of the species are represented by the remains of only a single individual in a particular layer; therefore, absences in other layers should not be taken too literally.

With the exception of the peccary, *Mylohyus*, the fauna is a modern one from bottom to top. The porcupine is south of its historically known range, but it is present in Early Woodland times as well as in Early and Middle Archaic, suggesting that the restriction of its range in this area may be relatively recent.

Considering the total mammalian list from the site, it is apparent that the only important mammals present in the modern Alabama fauna which are not

TABLE 31.—Number of animal species by layer at Russell Cave.

	Layer					
	B	C	D	E	F	G
Vertebrates						
Mammals	13	14	9	13	14	18
Birds	1	4	1	2	6	10
Fish	7	11	5	3	5	3
Turtles	4	6	3	3	3	3
Total	25	35	18	21	28	34
Molluscs						
Univalves	6	4	6	4	3	3
Bivalves	11	13	4	6	4	2
Total	17	17	10	10	7	5
Total	42	52	28	31	35	39

represented here are the weasel and the mink. We have, therefore, a rather complete utilization of the available mammalian fauna in all layers of Russell Cave. Expectably, deer is the dominant food animal.

While, in general, the mammals do not suggest climatic or biological conditions substantially different from today throughout the range of the site, we should take note of several features of the faunal assemblage of the Early Archaic (Layer G). The first of these is the presence of the extinct long-nosed peccary, *Mylohyus*, in Layer G. Lundelius (1960) states that the known faunal associations of this genus indicate forest situations. Martin and Guilday (1967, pp. 45-46) describe it as probably a woodland browser and omnivore, not indicative of a warm climate, widespread in the east in late glacial and possibly early postglacial times. They knew of no archeological associations of the genus. In another paper, Guilday (1967, p. 132) suggests that *Mylohyus* was in close competition with other omnivores such as the black bear, although he does not go so far as to evoke this competition as the cause of the extinction of the peccary. It would seem, therefore, that the presence of *Mylohyus* in the Early Archaic levels of Russell Cave need not be taken as a climatic indicator.

The other aspect of the fauna of Layer G is the relatively large number of gray squirrels. There is a minimum of 155 individuals of this species in Layer G, accounting for 78 percent of the individual animals in the layer. The gray squirrel was also heavily represented in the sample from the Dalton Zone in the Stanfield-Worley Bluff Shelter, following deer in the number of bones present (Parmalee, 1962). A casual review of other eastern faunal studies of archeological sites does not reveal any comparable situations. It is impossible to determine whether this

high squirrel percentage reflects an abnormally high abundance of squirrel or a preference on the part of one or more of the cultural groups present in Early Archaic times. If the former is the case, there might be a hint of the reason in Shelford's (1963, p. 20) statement in discussing the deciduous forest biome, "Most of the large and medium sized animals are permeant through both climax and seral stages; only the gray squirrel shows a preference for the climax."

More species of birds were taken in the Early Archaic than in subsequent periods, with the turkey ranking first in numbers and biomass. The passenger pigeon is another probable indicator of winter occupation of the site (see Weigel et al., this volume).

The only substantial increases in the number of species represented in Russell Cave occur after Early Woodland and are represented in the categories of fish, bivalve mollusks, and to a certain extent freshwater turtles. Most of these are derived from the Tennessee River, not from the immediate area of the site. While representatives of these categories do not constitute a very significant portion of the total food supply at Russell Cave, and it is impossible to say whether or not there was an absolute increase in quantity in the upper layers of the site, the increased diversity suggests stronger ties with the river. Perhaps, for some reason, the river was visited for collecting more frequently in the late periods. On the other hand, we may have here an indication that each group brought a quantity of aquatic food to the cave at the outset of the group's occupation.

Clench (this volume) has pointed out that the shells in Layer G are creek-dwelling forms. The species from the Tennessee River occur later and increase in variety in Layers B and C, supporting the general proposition note above. Of considerable interest is Clench's observation that the creek-dwelling periwinkles were the dominant mollusks at the site, and that all had the tips of the spires broken off, presumably as a result of their use as food. This feature provides one of the major cultural continuities at the site, and it would be interesting to know how widespread the trait is in the Southeast. Comparative data are lacking, except for the statement of Morrison (1942, p. 381) that the freshwater snails in the shell middens of the Pickwick Basin were utilized without breaking the shells.

As I evaluate the evidence from Russell Cave, there is little or no significant difference in subsistence during the long range of occupation of the

site. The pattern seems to involve a wide use of the available animals, with deer and turkey dominating; an inferred heavy use of the plant foods available, which in the winter would be largely restricted to items that could be gathered and stored; and a light but rather consistent use of aquatic resources, with those from the Tennessee River itself increasing through time. We do not know whether the inhabitants of the later periods brought corn with them, but the movement of even large quantities of food is not out of the question, as witness the Chippewa record cited by Quimby (1962). In short, the evidence from the cave itself suggests a livelihood based on hunting, fishing, and gathering. We know from other sites that the latter part of our time range falls well within the agricultural periods, but these activities were not being pursued at the time of year when the cave was occupied.

### Type of Occupation

In an attempt to gain insight into the type or types of settlement patterns present in Russell Cave, the artifact content was tabulated according to functional categories (table 32). The categories are patterned after those used by Winters (1963, pp. 39-41). However, our typology was not designed with this end in mind and, coupled with the pitfalls of functional attribution, our attempt is considerably less than perfect. Pottery is not included in this analysis for two reasons. The very quantity of sherds would, we believe, warp the percentage deceptively in the higher layers, and we would be considering containers in the ceramic levels while we had none preserved from the preceramic.

The major trends disclosed by the analysis are shown graphically in figure 61. Except for Layer D, which is also divergent in other respects, weapons show a steady percentage increase through time. But before we discuss the implications of this trend, we should examine an index which can be derived from the same data.

Winters (*ibid.*, p. 35) has developed what he calls a Systemic Index, which seeks to measure the relationship between hunting activities and the more sedentary patterns characterized by the processing of a wide range of raw materials and the manufacture of basic implements of production. His index is obtained by dividing the sum of the fabricating and processing tools and domestic implements by weapons. Categories such as general utility tools and

TABLE 32.—Artifacts by functional categories from Russell Cave.

	Layer B		Layer C		Layer D		Layer E		Layer F		Layer G	
	No.	%										
General utility tools	14	17.3	23	11.2	17	19.1	27	15.7	48	28.1	79	31.3
Weapons	56	69.2	108	52.7	34	38.1	78	45.4	67	39.4	88	34.9
Ornaments	2	2.5	11	5.4	13	14.6	13	7.6	3	1.8	3	1.2
Ceremonial objects			1	0.5								
Digging implements			5	2.4	1	1.1	1	0.6	1	0.6	2	0.8
Fabricating and processing tools	7	8.6	47	23.0	21	23.6	44	25.3	47	27.6	72	28.6
Domestic equipment			5	2.4	1	1.1	5	2.9	3	1.8	1	0.4
Miscellaneous	2	2.5	5	2.4	2	2.2	4	2.3	1	0.6	7	2.8
Totals	81		205		89		172		170		252	
Systemic index*	0.1		0.5		0.6		0.6		0.7		0.8	

\*The systemic index is the total of the domestic equipment and the fabricating and processing tools divided by the total number of weapons, as defined by Winters (1963, p. 35).

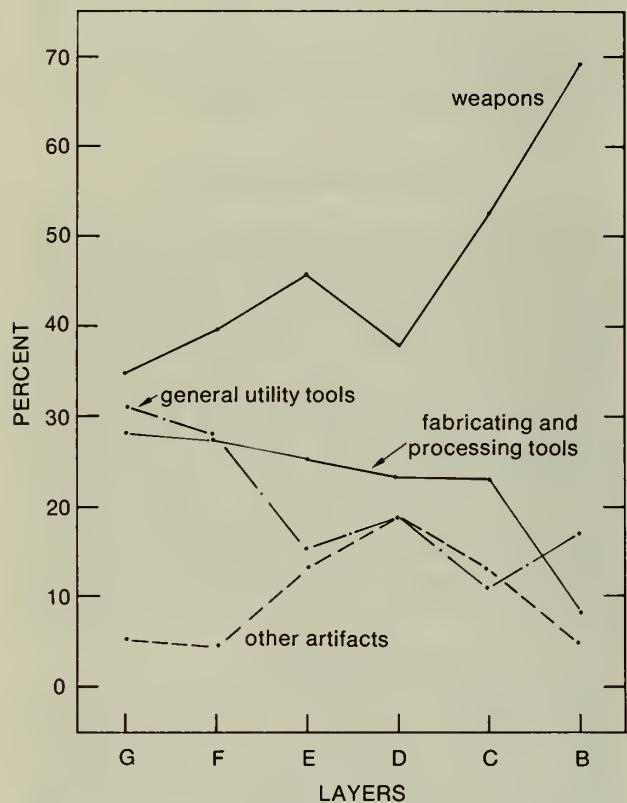


Figure 61.—Graphic comparison of percentages of functional artifact categories and cultural layers in Russell Cave.

ornaments are omitted from the calculations. Winters stresses that this is an experiment rather than a tested analytical tool. His trial runs on southern Illinois materials and on a few other selected sites yielded ratios for hunting camps ranging between 0.3 and 0.6, for base camps between 0.9 and 1.1, for transient camps between 1.5 and 2.0, and for permanent settlements between 5 and 20. The re-

sults of the application of this index to the Russell Cave material are given in the bottom line of table 32. All layers yield an index in or near the range of hunting camps and display a trend which would indicate a greater emphasis through time on hunting in relation to the total activity pattern at the cave. We regard this as a close approximation to the facts of the case.

Weapons (primarily projectile points) form the highest percentage category in all layers and account for over half of the artifact content in the top two layers. The importance in all layers of hunting is beyond doubt, but there are indications of variation in the extent, and primarily in the intensity, of other activities associated with this pursuit in the various layers of the deposit.

In Early and Middle Archaic times (Layers G and F), an approximate balance is struck between the major artifact categories, plotted in figure 61, which are compared to the situation in later times. This may be taken on an indication that, although a seasonal round utilizing different resources and different sites was already in existence, the activities carried out at the various sites occupied during the year were not yet highly specialized.

In late Archaic times we find larger sites with an expanded cultural inventory, particularly along some of the rivers of the Southeast. We may postulate that the stages of the annual cycle have become more specialized (although we hesitate to use the word because of contradictory uses of it in the literature). In such a situation we could well have a greater range of activities and a more complex technology for carrying them out at the same time that we find the winter hunting camp showing increased emphasis on hunting activity in relation to fabricating and

manufacturing. At first sight, Layer E materials look as though they fit the model perfectly. Even the evidence for less intense total use of the cave by people at this time level fits the situation. However, an additional factor may be involved at Russell Cave. None of the large riverine Archaic sites are known in the Guntersville Basin (Webb and Wilder, 1951, pp. 269-270). This portion of the river may for some reason have been less inviting in the Late Archaic, and the population may actually have been less than in the earlier stages of the Archaic. This could account for the apparent decline in intensity of use of the cave. But the fact that hunting is emphasized somewhat more than before could still argue for increased specialization at this time level.

The Early Woodland of Layer D is poorly delineated here, as it is elsewhere. The intensity of site use seems only a little greater than in Early and Middle Archaic times, and the pattern of use as reflected in figure 61 is somewhat similar to the earlier Archaic periods also. This is obviously an intrusive culture into this part of the Tennessee Valley, perhaps bringing with it an adaptive pattern derived from a more northerly area.

By Layer C (Woodland) we are dealing with cultural groups which are presumably practicing horticulture, although not at Russell Cave. The weapon category here rises sharply, indicating that the cave was probably used as a winter hunting camp, with only minimal activity devoted to other cultural tasks.

With Layer B we are dealing with later manifestations of the same Woodland complexes and the bulk of what little Mississippian material is present at the site. Here, even more clearly, the emphasis is on use of the cave as a hunting camp. By Mississippian times, indeed, it probably served only as a stopping place for a completely male party engaged in the hunt.

Caldwell (1958, 1962) has characterized the Archaic of the eastern United States as the time of the achievement of what he terms "primary forest efficiency." As highlighted by Jennings (1968, p. 112), this concept holds that "the people of the Archaic stage learned to exploit a wider and wider spectrum of resources with ever-increasing skill until by 2000 B.C. there was a dense population enjoying an optimum adjustment to a generous environment." Within this continuum Fowler (1959) speaks of an earlier stage of Localized Adaptation and a later one of Specialized Adaptation, while Winters (1959) prefers the terminology of an earlier Foraging Stage

and a later Exploitive Stage. These are all frameworks for the same basic phenomena.

It is obvious that the Archaic layers of Russell Cave can be fitted into the general framework. The Early and Middle Archaic represent the earlier adaptive patterns, whereas the Late Archaic of Layer E represents winter camps of the later, more complex and specialized adaptive pattern.

## Cultural Reconstruction

Inasmuch as Russell Cave is a national monument in the National Park System and the excavations were undertaken for the purpose of interpreting the cave to the public, I feel an obligation to summarize the findings reported herein in terms of a reconstruction of the cultural history of the site.

Once the initial rockfall had formed a dry floor above the damp sinkhole base, Russell Cave became a suitable place for human occupation. Its east-facing mouth was protected from cold north and northwest winds and was warmed by the early morning sun. In addition, a permanent source of water was available immediately in front of the living area, and there was easy access down Doran Cove to the main valley of the Tennessee River.

The biotic environment probably differed little from that of the recent past, even though there must have been climatic fluctuations and accompanying influences on plant and animal life. Changes, however, were less pronounced than along the northern and western margins of the woodlands. Jennings (Spencer, Jennings et al., 1965, p. 54) states the situation in these words:

The interesting thing about all this is that Archaic stage man in the eastern United States experienced climatic ups and downs but, within very broad limits, had a more uniform and predictable and richer resource pool (very similar to today) to draw upon, than did his contemporaries in the western half of the continent.

The rich resource pool to which Jennings refers is the eastern deciduous forest biome and its constituent communities of plants and animals. At and near Russell Cave there would have been the wooded mountain slopes, the cove bottom, springs and streams; and slightly farther away the Tennessee Valley proper, the river edge and the river itself. The dominant animals of the biome, the deer, tur-

key, raccoon, and gray squirrel, as well as characteristic predators, such as the mountain lion and the bobcat, and that wide-ranging omnivore, the black bear, were all present. The cove and slopes would have supported mast-producing trees. The amount of browse for deer would have depended upon the amount of clearings and "edge," which may have been influenced by man's use of fire.

The surrounding forests supplied not only food but also most of the raw materials that the human inhabitants needed. One essential material, chert, was present in quantity as nodules in the limestone from which the cave was carved.

The picture of prehistoric life which we gain from Russell Cave is incomplete. The nature of the archeological record itself, which contains only the surviving elements of the material possessions of the people, is partly responsible for this situation. Moreover, we are viewing at Russell Cave only a portion of the annual life cycle of its inhabitants, for at other times of the year they were occupying different sites and, during part of the time range, they were engaging in distinctly different activities.

We are not able to identify tightly defined cultural units, such as components, at Russell Cave. Every layer yielded materials of various occupations with divergent assemblages. In this respect, Gould's (1968, p. 107) experience with modern Australian aboriginal camps is pertinent:

... Each man ordinarily fashions stone adzes and other tools around the hearth of his own campsite. Thus the fill of each campsite contains an abundance of small stone chippings. Except in cases where someone has died recently in camp, campsites tend to be reused, though not always by the same family. This means that stone chippings and discarded stone tools accumulate over the years in these places. Although I had hoped to quantify the amount of stone material a group might leave behind after a season's stay at this site, I found there was no certain way of distinguishing between stone chippings left recently and debris from earlier habitations.

This is precisely the kind of situation which, in view of the slow rate of accumulation in Russell Cave, must have prevailed in the site. Ignoring this factor leads to the creation of "unjustified unit definition" disparaged by Johnson (1967).

We must realize that we may never be able to

reconstruct the full annual cycle of a group, particularly that of a hunting and gathering people, from archeological remains. Campbell (1968) has described six types of settlements by an Eskimo group. Only two of these normally showed sufficient debris to permit discovery by archeologists centuries after their abandonment, and some types produced very little evidence 5 years after abandonment. Quimby (1962) has analyzed the yearly round of a Chippewa family of the late 18th century, stressing the variety of sites and tasks in a single year. Many of these sites would have yielded little or no debris to the future archeological investigator.

We may, however, be able to identify at some sites *phases* of the annual cycle of a people. Howard Winters has been concerned with this approach to the archeology of the Eastern Archaic. He believes he can isolate seasonal sites of the same cultural groupings, in one instance in Illinois (Winters, 1963), and in a series of sites in Kentucky (Winters, 1968). The general failure to make such inferences has been noted by Lewis Binford (in Lee and LeVore, 1968, p. 287):

There are cases that could be documented for eastern North America, where "cultural units" have been defined for sites that actually represent either seasonal or task-specific occupation. I refer particularly to some of the sites along the Tennessee River.

We cannot define the location and nature of all the sites occupied by the various groups who inhabited Russell Cave. However, we can cite the reconstruction by Winters (1959) of the earlier Archaic peoples of Illinois as probably applying equally well to northern Alabama, if we add some emphasis on the resources of the river:

... were we able to follow a typical band throughout the year, we might find them during the fall in a camp near a grove of nut trees. After their departure from this camp, the ground would be left littered with the pebble grinding stones, pestles, grinding slabs, and nutting stones which had been used in preparing the harvest of nuts and other ripe seeds for consumption and storage. The winter would perhaps be spent in a rock shelter, where campfires placed towards the front of the shelter would warm the interior both directly and by heat reflected from the rock above. There would be innumerable fragments of burned

hearths, since throughout the year stone boiling was a standard procedure for cooking food. sandstone or other rock scattered around the That is, stones were heated in the hearths and dropped in the skin or bark food containers. Part of their food would be supplied from the fall harvest which had been stored in pits in the floor of the shelter. Deer and other game would have formed another part of their diet, since hunting was very likely a year-round activity. As always, there was need for chipping dart and spear points and making other stone tools. . . . With the coming of spring, open campsites would again be reoccupied for the gathering of edible plants and roots. In the following months the camp would move from time to time as game was depleted in the area and as new food sources became available in other areas. With the fall, we should again find our band at its site near the nut groves, completing its seasonal round. . . .

At the other end of our time scale, the Mississippian hunters who sporadically used the cave came from large settled agricultural villages in the bottomlands.

### Transitional Period

In the current parlance of Alabama archeology, a Transitional Period is recognized between the Paleo-Indian and Early Archaic Periods. Perhaps the most diagnostic artifact type associated with this period is the Dalton point. One specimen of this type was found in our excavations at Russell Cave.

Hack (this volume) postulates that the rockfall which first made the cave habitable occurred between 12,000 and 9,000 years ago. Since the Dalton horizon dates from about 10,000 to 9,000 years ago (8000–7000 B.C.), it would have been possible for makers of Dalton points to have entered and used the cave at that time. The relatively recent rockfall at the mouth of the cave (fig. 3) may cover an area containing the earliest deposits, and this portion of the shelter has not yet been excavated.

### Early Archaic, 7000–5000 B.C.

This is the first period, represented by Layer G, for which we now have adequate information. Over a period of about 2,000 years small groups of people, probably no more than an extended family or a

microband, used the cave as a winter settlement. We do not know whether the cave was used every year, and we cannot tell whether it was occupied during all or part of the winter season. Twenty named types of projectile points were found in Layer G. Whether this array represents as many as 20 distinct cultural groups (or identity-conscious social groups) remains an open question, but the length of time involved would not rule out this possibility.

The Layer G people brought into the cave the products of their hunting and gathering activities. The bones and shells recovered indicate that a wide variety of animals was taken. For at least a portion of this time period the gray squirrel was taken in numbers, and on at least one occasion a now-extinct species of peccary was killed. As in all later periods, deer provided the bulk of the meat diet.

Deer and other larger animals were probably taken by direct hunting with stone-tipped spears or darts. The bow and arrow is not usually considered an early Archaic weapon, although some of the projectile points are small, and the bow was seemingly present in Europe at least as early as 8800–8300 B.C. (Clark, 1963, pp. 61–62). Smaller game was probably taken with snares and/or traps which have left no archeological evidence. At least one method of fishing is suggested by the single bone fishhook found in Layer G. Box turtles and shellfish were probably just picked up.

Some use of the plant world is indicated by the mortars and millers present in this layer. Cane matting impressions were found and, if Jennings is correct, many of the items classified as awls were used in the manufacture of basketry. The needles, however, may imply leatherwork. Nuts would have been available and were probably used. They could have been cracked with unspecialized stones, with the anvil stone possibly held in a basket to catch the scattered shells and meats.

Cooking was done over the open fires, either by roasting or by the use of stone boiling in either baskets or skin containers. Firewood was, of course, another major item introduced into the cave by the human inhabitants.

Antler flakers and drifts, as well as numerous small chert chips, indicate that flintworking was carried on in the cave. Most of the stone used came from nodules in the limestone at or near the site.

Several bone and antler ornaments were found, but ornamentation in nonperishable materials was

either rare or the ornaments were carefully preserved and did not find their way into the midden.

One burial was found in Layer G, an infant (Burial 2), unaccompanied by grave goods.

At or before the time of the spring floods, the people probably left the cave for other sites used during their annual round, the pattern of which is unknown to us at this time.

### Middle Archaic, 5000–3500 B.C.

Life during this 1,500-year span, represented by Layer F, continued in much the same way as in the Early Archaic. The known food resources exploited by the people are the same, except that gray squirrels are not as common, the peccary is now extinct, and fewer species of birds are present. This is the first period in which storage pits occur, albeit few in number. The absence of storage pits in the Early Archaic and their scarcity here may be due to their obliteration by flooding. It may also have been too damp for underground storage, with a consequent use of above-ground containers for this purpose.

Projectile points of 14 named types were found, and this raises again the problem of how many cultural groups may be represented by them. However, in some cases, such as the three Morrow Mountain types, a relationship can be seen which reduces the number of potentially distinct cultural groups that may be involved.

Although most of the other artifact types occur in both layers, there is a distinct drop in the proportion of uniface stone tools to bifacially worked ones (exclusive of projectile points): 73 percent of the tools are uniface in the Early Archaic but only 23 percent of the tools are uniface in the Middle Archaic.

Five of the six burials we uncovered can be attributed to this period. These include the well-preserved burials of a female (Burial 1) and of a male (Burial 4).

If there are any significant differences in the general lifeway between Early and Middle Archaic times, they are not evident in the winter camp at Russell Cave.

### Late Archaic, 3500–500 B.C.

Of all the layers used in our analysis, Layer E, representing the Late Archaic, shows the slowest rate of accumulation and the lowest number of artifacts per year. In the preceding section of this

volume I interpreted Layer E as representing shorter term or more specialized use of the cave at this time, and have discussed the relation of this pattern to the Late Archaic of the Southeast. I would stress, however, that the trait lists do not indicate a decline in the number of types of artifacts. Hence what we may be seeing is evidence of less intense pursuit of other activities in relation to hunting rather than a restriction of the scope of activities.

This layer has the highest percentage of projectile points (more than 76 percent) which are placed in the unnamed "provisional" categories, suggesting that more intensive analysis needs to be carried out on the weapon points of Late Archaic times. A general increase in size of the projectile points is also noted. Caldwell (1958, p. 13) is inclined to view the development of these large points as a crucial part of the Archaic adaptation to more efficient hunting in the woodland environment. This hypothesis deserves testing.

There are no really noticeable additions to the artifact assemblage at Russell Cave at this time that cannot be explained as a function of sampling. Nut-stones, for example, appear for the first time in this layer, but they are known from other sites at earlier periods.

### Early Woodland, 500 B.C.–A.D. 100

The break between Layers E and D is sharp. The large Late Archaic projectile points are replaced by smaller stone points presumed to have been used with the bow and arrow. Pottery vessels appear, and with the continuity of many of the simpler artifact forms (which are extremely widespread in time and space) it is clear that we are dealing with a very different cultural complex. Such an abrupt break is usually interpreted archeologically as evidence of the intrusion of a new people into the area, and in the present instance we accept this interpretation.

Caldwell (1958, pp. 23–27) has discussed other manifestations of similar material which he groups under a Middle Eastern Tradition, intrusive from the north. He is struck by the large numbers of storage pits containing (or once containing) acorns which he found in the Kellogg focus in northern Georgia, and suggests that this is the period when the acorn came into maximum use. Storage pits do occur in Layer D at Russell Cave, but they do not seem to be as abundant as in the next period.

About the same range of activities seem to be

carried out in the cave as before. As far as manufacturing is concerned, we have no evidence one way or the other as to whether the pottery was made in or near the cave or was brought to the site from somewhere else. It is almost an axiom in archeology to assume that the presence of pottery implies some degree of permanency of settlement. In my view, this should not be inferred from Russell Cave itself. The average number of sherds per year (table 30) could be accounted for by the shattering of several vessels each year, and it was not beyond the capabilities of these people to have brought a few pots with them from, perhaps, a settlement on the banks of the Tennessee River. Sites of this and subsequent ceramic periods are present in the Guntersville Basin.

### Woodland, A.D. 100–1000

We are here grouping the limestone-tempered pottery of two layers, C and B. Our estimate for the end of Woodland times is based on extra-site considerations and hence does not coincide with the time range given to the layers.

The proportionate increase of hunting at the expense of other activities is marked in these layers, and we can regard the use of the cave now as a purely winter hunting camp. Layer C, however, is the source of the largest number of storage pits in the section of the site which we excavated, implying considerable use also of plant foods.

By this time the people must have been living for a considerable portion of the year at horticulturally based settlements. Forays from the village would have been made for various natural foods and materials, and perhaps the village broke up, at least

partially, during the winter with small groups exploiting various places, of which Russell Cave was one.

### Mississippian

Evidence of use of the cave by Mississippian peoples is very sparse. An even larger portion of the year was spent at the permanent village, with parties engaged specifically in the hunt stopping occasionally at the site.

### Historic

The trend of the Mississippian period became even more pronounced. Our only evidence from the cave during the Historic Period is a metal fishhook, which may have been dropped by an Indian or an American settler.

### Summary

Man's occupancy of Russell Cave during more than 8,000 years was intermittent and seasonal. Used always as a winter hunting camp, there was a tendency over the years for this activity to become a more particularized aspect of the range of cultural activities. This trend persisted at the same time that Southeastern aboriginal culture was becoming more elaborated, culminating in the agricultural complexes of early historic times. In a sense the trend exhibited at Russell Cave runs counter to the course of cultural history in the Southeast. Yet it testifies to the diverse, adaptive ways of life revealed by the overall cultural history of this region.



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